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CATALOGUE

OF THE

NINTH EXHIBITION OF INVENTIONS.

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CATALOGUE

OF THE

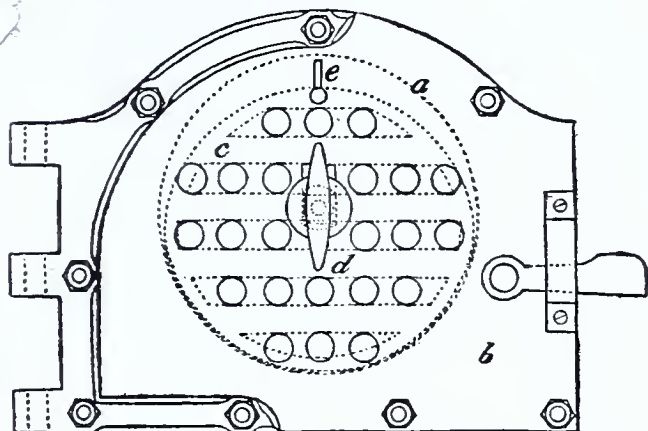
NINTH EXHIBITION OF INVENTIONS,

BRING A COLLECTION OF ARTICLES RECENTLY INVENTED, PATENTED, OR REGISTERED,
EXHIBITED AT THE SOCIETY'S HOUSE, DURING THE SPRING OF 1857.

N.B.—The Council wish it to be distinctly understood that they are not responsible for any of the statements contained in this Catalogue. They regret that in some instances Exhibitors have failed to supply descriptions. They have to thank several of the Exhibitors for the loan of the wood blocks used as illustrations. Where an asterisk () is prefixed to a number, it denotes that the article exhibited is a drawing.*

1. ENGINEERING AND MECHANICAL APPLIANCES.

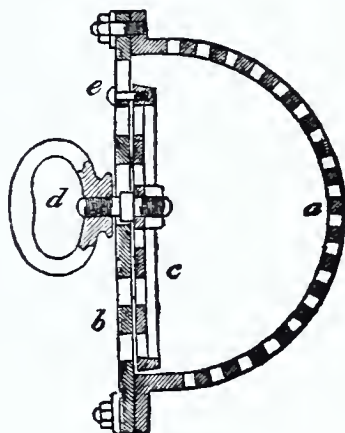
1. Patent Regulating Air-door for Furnaces; John Lee Stevens, Fish-street-hill.



This invention consists of an inner hemispherical compartment, *a a*; an external door-plate *b b*; and an intermediate adjusting-plate, *c c*, which can be fixed in any required position by the handle *d d*, the guide-pin, *e e*, keeping the slots of the plate *c* parallel with the apertures in the plate *b*.

2. Patent Self-acting Apparatus for Preventing the Formation of Smoke in any description of Closed Furnaces; Fernihough and Farrow, Dukinfield, near Manchester.

Many ingenious methods have been contrived,



with a view to supply and combine with the gases in the furnace the equivalent of atmospheric air necessary to effect their perfect combustion, and thereby prevent the formation of smoke; yet, however valuable, the nature of their mechanical agencies, and the amount of attention required on the part of the fireman to produce the desired effect, have alone been sufficient to prevent the general adoption of any particular invention based upon the principle of Williams's original patent of 1839. The object of the inventors in the construction of this apparatus has been to render it cheap, self-acting, entirely independent of any attention on the

part of the fireman, and applicable to all closed furnaces. The patentees do not profess to heat the air previously to its admission to the gases in the furnace. The closely-set vertical bars at the back of the door are intended to shield the valves in the front from the action of the fire, and divide the air into thin streams. The mode of adjusting the valves is as follows—The fire is allowed to burn down until no more combustible gases are given off, when the valve weights are then adjusted so as to allow the valves to close of themselves. Upon the introduction of a fresh charge of coals, the valves will be found to open just in proportion to the amount of combustible gases generated, and again resume their former closed position as soon as the fire has burnt down to the same state as that at which they were set. This action, it will be seen, is caused, as a matter of course, partly by the chemical affinity that exists between highly-heated hydrogen, &c., and oxygen, and partly by the additional draught created by converting the combustible gases into flame instead of smoke. The valves may be applied in any desired form, to any part of the furnace or flues, but the patentees prefer placing them in the furnace-door, in the manner shown in the apparatus. The apparatus is now in successful operation in various furnaces, from the largest steam-boiler furnaces to those of bakers' ovens.

3. Gray's Patent Air-channel Furnace Bars Exhibited by W. Day and Co., Bow-road.

By the use of these bars air or oxygen is supplied in much greater quantity to the burning fuel than by ordinary bars; and on the same principle as in modern lamps, it produces an intenser fire with less consumption of fuel. The air not only rises between the bars, as in an ordinary furnace, but also passes up through the air-channels, radiating to every portion of the hottest fuel resting upon the face of the bars, and the additional supply of air assists to cool or preserve the bars, and, after mixing with the fuel, causes an intenser combustion. Hence, more heat is evolved from every pound of fuel used, and consequently steam is generated much quicker—a result as correct in practice as in theory. The engraving illustrates the new bar. The upper sur-



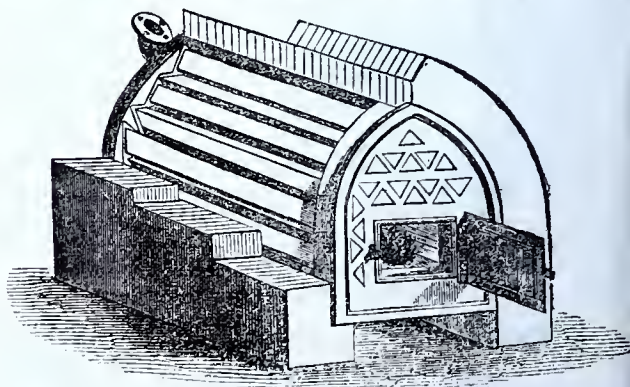
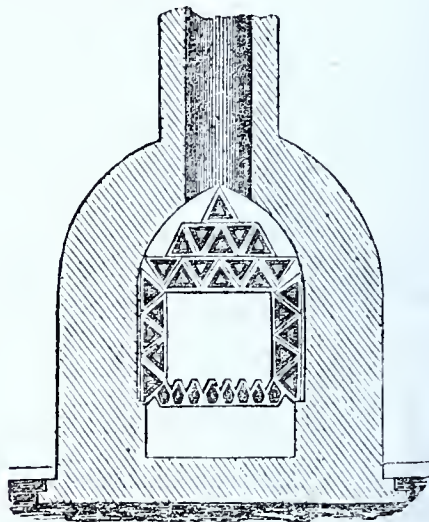
face of each bar is flat. It differs from the ordinary bar in being intersected by a series of diagonal air-channels, always grooved in the direction to the back of the furnace, so as not to impede a free current of air; while the channels below are made much wider than on the upper surface, so as to increase the area for the passage of air under and into the burning fuel. The lower channels of the bar form an inclined plane from the centre down each side, so as to allow dust and ashes to escape. The diagonal position of the channels on the upper surface allows of a rake or sifter being passed over the bars, to arrange the fire, or to rake out clinkers or ashes, as may be required, while the flat spaces between the channels serve to support the fuel. It will be evident that, by constructing the bars, of what-

ever size, upon this principle, a large additional area for the entrance of air is obtained, and the combustion thereby rendered more perfect. The air-channel bar may be substituted for the ordinary bar, without the objectionable proceeding of plugging the boiler, or of any filling whatever. Where thin bars warp or fail, this form of bar may be advantageously used. It is also applicable where an endless chain of fire-bars is used, or to the old plan of moving bars, also to every description of locomotive, marine, and stationary boilers, and for all manufacturing purposes, retorts, &c. The owners of four forty-horse boilers, in order to test minutely the difference between the old and the new bars, instructed their engineer to apply the counting machine to the engines, when the recorded revolutions were as follows:—

	Revolutions.	Cwt. Fuel.	Revolutions per cwt.
Old thin bars	121,674 ...	465 ...	261
Air-channel bars...	162,976 ...	502 ...	324

The result shows a difference of 63 more revolutions for every cwt. of fuel used with the patent bars. Or, if 121,674 revolutions with the old bars consume 465 cwt. of fuel, then 162,976 revolutions would consume 622 cwt., whereas the counting machine proves that the patent bars consumed only 502 cwt., being a saving of 120 cwt. in favour of the new bars, or full 20 per cent. saving of fuel.

4. Patent Triangular Tubular Boiler; T. G. Messenger, Loughborough.



In this boiler, the immense surface exposed to the direct heat of the fire is obvious, and by

the arrangement of parallel triangular tubes, no particle of heat can escape without first doing threefold the work it would in any other manner of construction. The horizontal position of the tubes, and the triangular shape, cause the heat in its upward current to rebound from tube to tube, so that before it can reach the flue, the whole of the heat is expended in the boiler. The rapid circulation of the water, which is the ground-work of the principle, caused by the action and reaction of the fire, is considerable. Should the boiler at any time require cleaning, it can be done by removing the ends which are made in separate parts. The fire-bars form water-spaces; consequently they cannot be injured by the action of the fire,—and the bars themselves become a working part of the heating apparatus.

***5. Patent Retort Boiler ; Dunn, Hattersley, and Co., Manchester.**

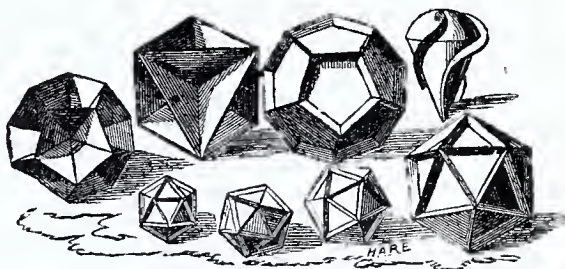
This boiler is composed of a series of similar water-chambers, arranged across the furnace. A feed-pipe runs below, and is connected with each of the chambers, and a steam pipe is similarly connected with them above. The object of this arrangement is stated to be increased facility of transport, and additional safety.

***6. Combined External and Internal Furnace Steam Boiler ; D. Auld, and J. Stephen. Exhibited by W. and J. H. Johnson 47, Lincoln's-inn-fields, and Glasgow.**

This boiler is of the stationary kind, as used for general factory purposes. It has been devised with the view of being worked with both external and internal furnaces and flues in combination, the object being the securing a superior concentration of boiler power, the economy of fuel, and the prevention of smoke. The lower furnace is fed from a pit beneath the staging or platform upon which the fireman stands in feeding the upper one. (See the *Practical Mechanics' Journal*, Vol. I., 2nd series, page 257, January, 1857.)

7. Patent Automatic Scavengers, for keeping Steam-Boilers free from Mud deposit, or

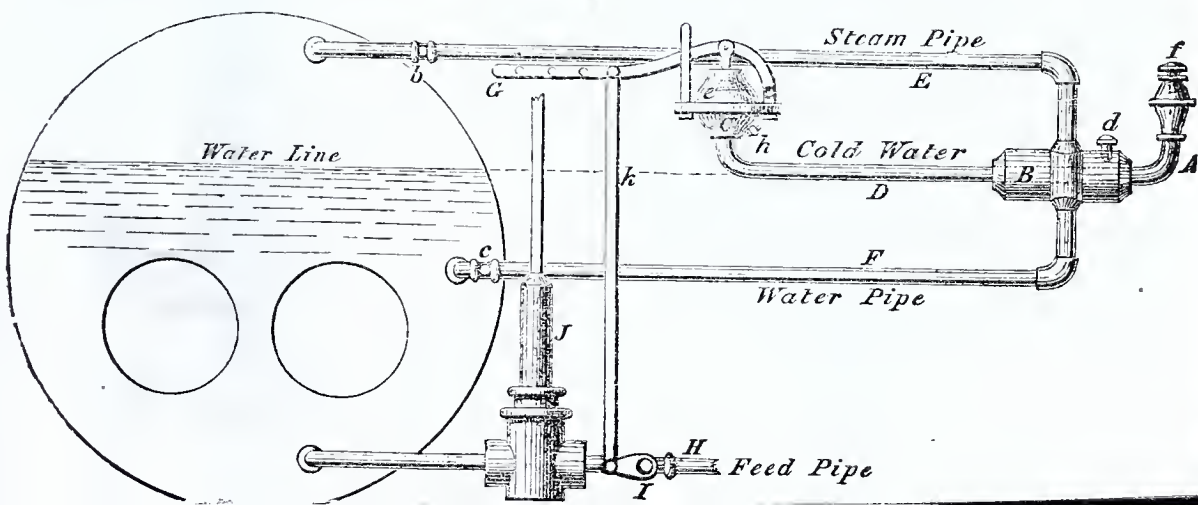
Scale ; J. W. Duncan. 24, Grove-end-road, St. John's-wood.



These articles, which are of metal, are put into the boiler with the water, where they sink to the bottom, owing to their great specific gravity; but when ebullition takes place, the steam, in rising, fills the cavities in the lower sides of some of the scavengers and lifts them up; it also produces a rotary motion in those furnished with spirals, which are of less specific gravity than the water under steam pressure, and causes them to move about and act upon the sides and bottom of the boiler, their action clearing off the scale or mud deposit. The motion of the scavengers in the water is found to equalise the temperature, producing more steam, and preventing in a great degree, the formation of large bubbles, which usually rise from the bottom of the boiler, and cause the water to be thrown up amongst the steam, thereby producing priming.

8. Lapham's Patent Self-acting Water Regulator for Steam Boilers. Exhibited by W. Day and Co., Campbell-road, Bow-road.

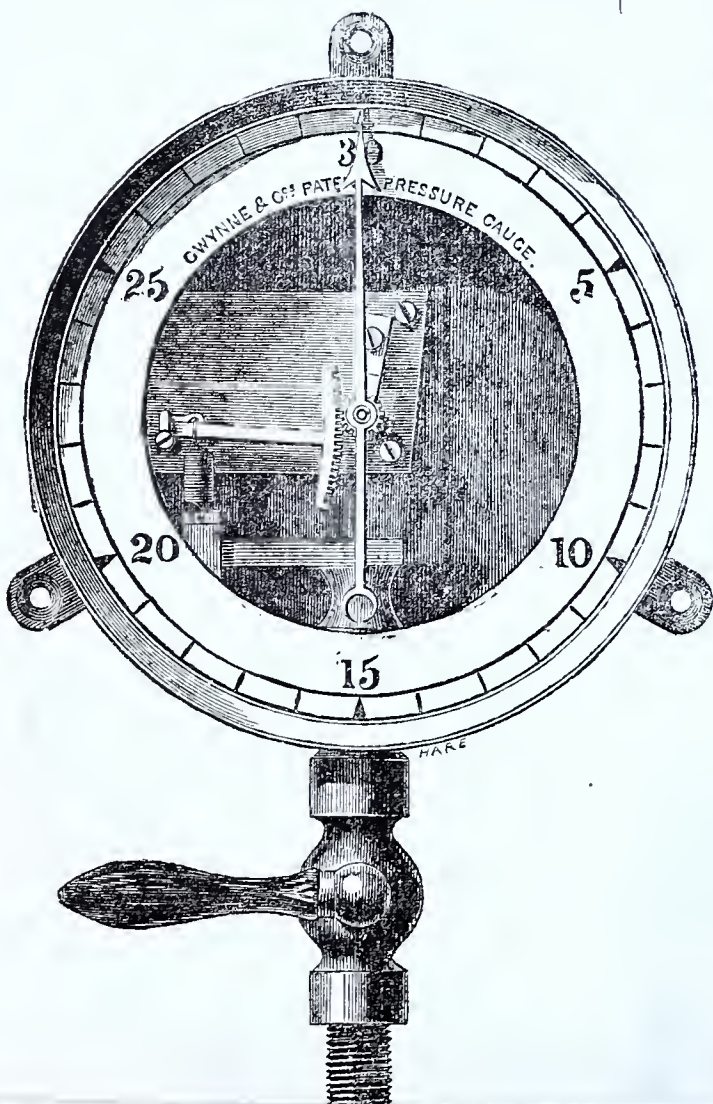
This is an American invention, and consists of a pipe and cylinder in communication, situated at the proper level of the water in the boiler; these are kept filled with cold water. Two pipes proceed to the cylinder, the one from the steam portion of the boiler, and the other from the water space. When the water falls below the proper level, steam passes through the upper pipe, and expanding the water in the cylinder and pipe causes an expansive action against an India-rubber diaphragm, to which is attached a lever acting by another lever upon the valve of the feed pipe. The accompanying engraving will illustrate its construction more



fully, and the following are the directions issued for its use:—Unscrew air-plug *h* in cup-shaped cylinder *C*, and also water-plug *f*, from which fill pipe *A D* with cold water, which will fill *C* until it reaches Indiarubber diaphragm or piston *e*; screw up *h* tight and fill with water until it overflows at plug *f*; then, with red lead or otherwise, make *f* airtight.—*This is a permanent arrangement.* Open stop-cocks *b* and *c* in steam and water pipes *E* and *F*; unscrew air-plug *d* in cylinder *B* until steam begins to blow off; then screw down tight. *This must be done every morning.* The water in cylinder *B* or pipe *F* will then be at the same level as in the boiler, but at cylinder *B* will be nearly cold, having no effect on the water in pipe *A D*; but, as the water in the boiler falls below cylinder *B*, it will necessarily fill with steam, and, by heating and expanding the water in pipe *A D*, will raise piston *e*, and consequently lever *G*, which will open stop-cock *I*; admitting water from feed-pipe *H* to pump *J*, raising water in boiler to its proper level, filling *B* with water which will cool water in *A D*; the pressure of the atmosphere will then force back piston *e* and lever *G* to their proper level.

9. Patent Gauges. Gwynne and Co., Essex-wharf, Essex-street, Strand.

For indicating the pressure of steam, gas, water,



and other fluids; for sounding at sea, and ascertaining the amount of vacuum in condensers, &c. The pressure of fluid or gas acts upon a piston, working without friction; the piston is attached to a lever, and gives motion to the indicating hand by a rack and pinion; a spring attached to the lever regulates the motion of the hand. Their action is equally precise, whether close to or at a distance from the boiler, receiver, or other vessel, &c., as well as being certain, regular, and not liable to disturbance or interruption.

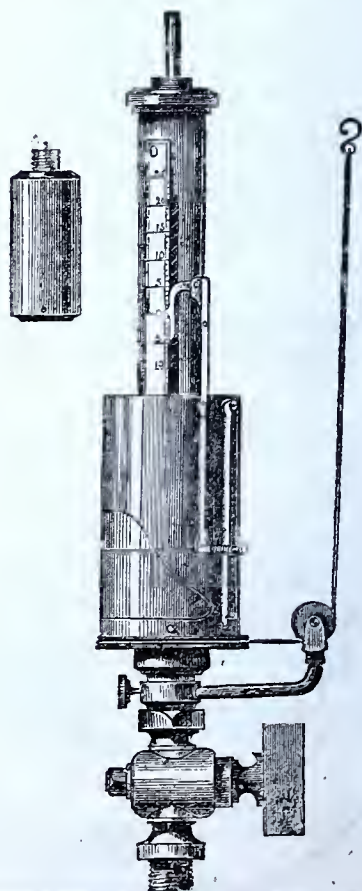
10. Patent Steam-Gauge; Chadburn, Brothers, Sheffield.

11. Patent Water-Gauge; Chadburn, Brothers, Sheffield.

12. Apparatus for Measuring the Speed of Currents of Air and Water, and Indicating the Speed of Ships; P. De Fontainemoreau, South-street, Finsbury.

The apparatus consists of a double conical tube. At the part where the tubes are joined together, is fixed a small tube at right angles to the centre line of the cones. When a current of water or air is passing through the cones, it causes a sucking action, or negative pressure, to take place in the small tube, which, being attached to an indicating apparatus or meter, will shew at once the velocity of the current of air or water.

13. Hopkinson's Improved Steam Engine Indicator, for High and Low Pres-



sure. Exhibited by A. P. How, 81, Mark-lane.

In these indicators the revolving cylinder is not detached from the other portions of the instrument, as in those generally made, but is placed round the barrel of the indicator, being in that place more convenient and firm for the operation which has to be performed upon it. A tremulous or unsteady motion of the pencil to the revolving cylinder must necessarily impart a like defect to the diagram, and is calculated to lead to erroneous conclusions upon points of extreme nicety, as to the actual condition of the engine, or the minute alterations of its working parts required to secure the greatest effect for the least expenditure of power. These instruments have all the working parts truly and accurately fitted, so as to produce true and steady motion, with the least possible friction.

14. A Direct-Acting Pendulous Steam-Engine; Thomas Hitt, 33, Southampton-street, Strand.

This model represents two working steam-engines, the power of each being communicated through a different mechanical action; one, the old-established crank, and the other (the smallest of the two) through a new horizontal escapement, or a new mode of employing the ratchet, which produces an almost frictionless action, continuous and direct, imparting an even and uniform motion. It also dispenses with the fly-wheel. On the whole it occupies two-thirds less space than the steam-engine now in use. Every part of this machinery will admit of being very much worn before rendered unfit for use. By means of an eccentric acting in conjunction with the cross head, the return escape pauls are lifted from off the periphery of the wheel, and deposited at the end of the stroke, producing a faint noise resembling the ticking of a clock. The backward action of this machinery is obtained by means of two vertical wheels, fixed in a horizontal telescopic shaft, and being allowed to slide to and fro, gearing into the different edges of the horizontal wheel, as exhibited, with the part containing screw propeller.

15. Metallic Packing for Stuffing Boxes and Pistons; P. De Fontainemoreau.

This improved packing consists of a series of metallic rings, between which are placed steel plate springs. These springs serve to press the metallic rings tight against the rod or cylinder.

*16. Geared Trunk Marine Engines; Messrs. Tulloch and Denny. Exhibited by Messrs. W. and J. H. Johnson, 47, Lincolns-inn-fields and Glasgow.

These engines are fitted in the steam ships *Cottingham* and *Empress*. They are peculiar, in so far as they are of the trunk class, fitted with spur gearing for driving the screw propeller. The dimensions are:—Diameter of steam cylinders, 50 inches; diameter of steam cylinder trunks, 31 inches; effective diameter of piston, equal to 45 inches; length of stroke, 42 inches; diameter of air pumps, 26 inches; length of stroke, 24 inches. The mortise spur wheel on the first motion shaft is 9 feet diameter, 24 inches broad on the face of the teeth, 4 inches pitch, and has 85 teeth in it. The screw propeller is of cast iron, and is three-bladed, 11 feet

diameter, 13 feet pitch, increasing to 14 feet 3 inches pitch. The boilers are two in number, containing 372 brass tubes $3\frac{1}{4}$ inches outside diameter, and $6\frac{1}{2}$ feet long. The fire grate area forms in the aggregate 119 square feet. The *Empress's* average speed, with a consumption of 19 tons of coal per day, is $10\frac{1}{2}$ knots per hour. (See the *Practical Mechanics' Journal* Vol. 1., 2nd series, page 147. September, 1856.)

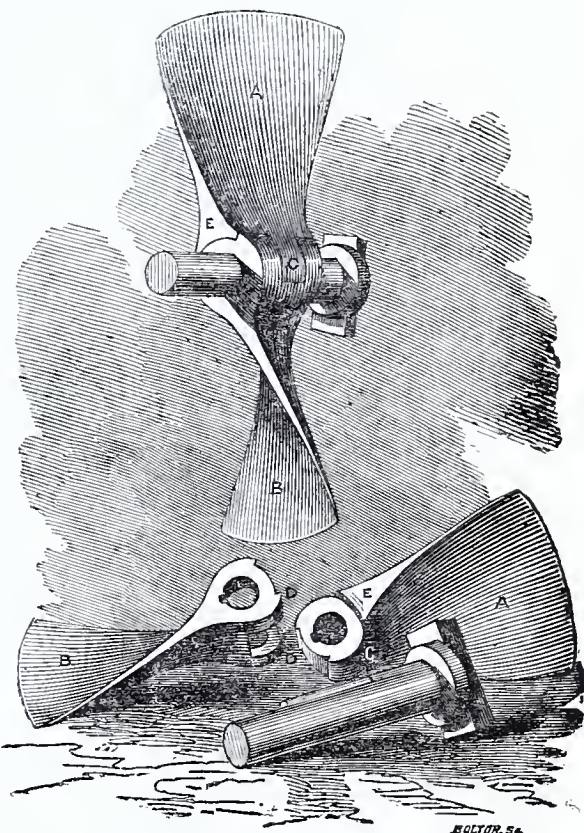
17. Patent Improved Paddle-Wheels: C. P. Sharpley, Berry's Cottage, Chapel-street, Stockwell.

This invention consists in making the paddle-wheel as a continuous annular spiral paddle, or, in other words, in place of using a series of floats set in a wheel-shaped frame, an endless spiral float is substituted for them. This spiral float is fixed to the frame in such a manner that the plate of which it is composed shall always enter and leave the water edge-foremost, so as to receive the least possible resistance from it.

*18. Improvements in Screw Propulsion. Exhibited by T. Hitt, 33, Southampton-street, Strand.

In this system of propelling, two screws are placed at an angle of (say) forty-five degrees, the right screw rotating towards the left, and the left towards the right.

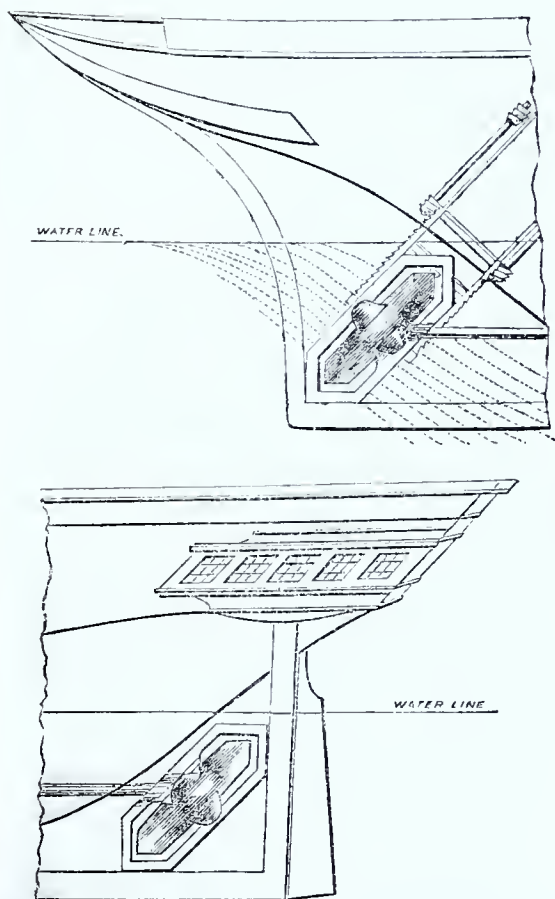
19. Knuckle-jointed Screw Propeller: William Lynn, Assistant Inspector of Steam Machinery, H M. Dockyard, Portsmouth.



The advantages of this peculiar mode of constructing the blades of screw propellers are that they enable all vessels to carry spare screw propellers without taking up much valuable space. These propellers are easily taken to pieces, and

stowed in any portion of the hold, economising space, and obviating the necessity for fixing the spare screw, as at present, upon the decks, or over the hatchways, thereby relieving the ship of so much more additional top-weight, and removing all fear of splinters in case it should be struck by shot. In the event of its being necessary to ship the spare screw, the blades, by being in halves, are more easily transported along the deck, and shipped with greater facility. In the annexed woodcut A represents the blade, having the knuckle or small portion of the joint at boss C. B. Corresponding blade, having the double knuckle or female portion of the joints D D. E. Shoulder of the single knuckle, which abuts on and forms a stop into the recess, upon the top side of the double knuckle. The whole being accurately fitted together the eye is made to receive the screw spindle, or T-headed shaft, which is secured by means of a feather or key fitted into it.

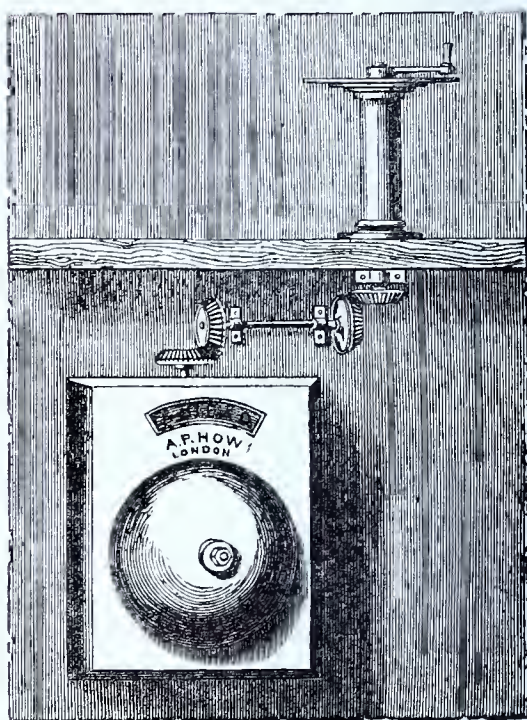
20. Patent Oblique-Action Propellers; J. W. Dunean, 24, Grove-end-road, St. John's-wood.



In this propeller the blades work in a plane at an acute angle, approaching forty-five degrees to the line of motion of the vessel. This arrangement admits of the effective use of screws of a diameter nearly one-third greater than is applicable according to plans heretofore adopted. Independently of one at the stern, another may be fitted at the bows of a vessel (in the cut-water), in which it will work more in equilibrium, and with better impelling effect than propellers working in a vertical plane, at the stern, as usual.

21. Engine Room Telegraph; A. P. How, 81, Mark-lane.

This telegraph is designed for communicating directly between the captain and engineer. It is worked from the bridge, where a column carries a dial, on which are engraved the necessary signals. There is a corresponding dial in the engine-room, and the communication is by a spindle and tooth wheels. The captain wishing the vessel to go "a-head," moves a handle on the top dial until he brings it directly over the word "a-head" on the dial. In this action a gong is sounded in the engine-room, and the engineer's attention is thus directed to the dial, which, being cased in, exhibits only one signal at a time; the possibility of accident is thus prevented.



22. Engine Room Telegraph, with illuminated Dial. A. P. How, 81, Mark-lane.

In these telegraphs, as now constructed, an important improvement has been effected, namely, the top part of the column on the bridge has been enlarged, so as to admit of a lamp being fitted internally, which exhibits the signals clearly at night, the dial being now made partly of ground glass with the words painted thereon in addition to their being engraved on the brass of the dial.

23. The Helmsman's Telegraph; J. and A. Ridsdale, 54, Minories.

The above invention is intended to effect a speedy and efficient communication from the officer in command of steam or other vessels, to the Helmsman or Quartermaster. To the three handles are attached three coloured discs for the day signals, and for the night signals, three lanterns, with corresponding colours, working in the interior of the telegraph. By moving either of these handles as may be required, instantaneous orders or

signals can be given. A small hand lantern, with corresponding colours, is placed near the wheel, to be used by the Officer or Quartermaster at night, as proof that the signals have been duly observed. On leaving or entering harbours at night, the difficulty of passing the word from one part of the ship to another often leads to confusion, more particularly when steam is blowing off. This the telegraph is intended to remedy. Also the shouting and noise made at present, causing so much alarm to passengers will be entirely done away with, and the orders from the bridge carried out with silence and efficiency.

24. Model of the Screw Steamship *Torino*; exhibited by A. P. How, 81, Mark-lane.

This model is to the scale of one-eighth of an inch to the foot. The vessel is 265 feet between the perpendiculars, 38 feet broad, with a depth of hold of 28 feet, and draws, when loaded, 20 feet. She is three-masted and barque-rigged, the whole of the standing rigging being wire-rope, and has a poop deck and raised fore-castle, with engines of 300 h. p. nominal, by Messrs. Maudslay, Sons, and Field, direct acting, horizontal, and with tubular boilers. The diameter of the screw propeller is 16 feet, and the pitch 19 feet 6 inches. She has How's mechanical telegraph for communicating between the captain and engineer, and improved engine-room fittings. The vessel is the property of the Genoa Transatlantic Steam Company, recently established to form a regular line of communication between Genoa, the United States, and South America.

25. Model of the New Royal Yacht; exhibited by A. P. How, 81, Mark-lane.

This model is to the scale of one-sixteenth of an inch to a foot. The vessel was designed and built at H.M. Dockyard, and has oscillating engines by Messrs. J. Penn and Son, of Greenwich.

26. Ships' Rudder; John Holman, Topsham. Exhibited by F. Walker, 173, Fenchurch-street.

In this rudder the braces and pintles usually employed are dispensed with.

27. Improvements in Shipbuilding; P. De Fontainemoreau, South-street, Finsbury.

This invention consists first, in a peculiar mode of constructing keels of vessels; and secondly, in constructing and strengthening the hulls of vessels by means of iron brace pieces, and by an improved method of uniting and fitting the ribs together, so that the hull shall be strengthened throughout.

28. Patent Improvements in Working and Protecting the Sails of Ships, &c.: Samuel Dyer, Bristol.

The invention consists in the adoption of a hollow or tubular yard, with an opening to allow the sail to pass into it, such yard being provided with a roller, which runs through the same from end to end; upon this roller the sail is wound by the aid of pulleys worked on deck. By this means the whole of the sail may be en-

closed in the hollow yard, and preserved from injury from wet, &c.

29. Patent Improvements in Reefing, Furling, and Setting the Sails of Ships, &c.; Samuel Dyer, Bristol.

This invention consists in the adoption of certain improved appliances for effecting these objects from the deck of the vessel. In the case of a topsail a yard is used, and an iron or other roller. This yard has at each end several sheeve holes (three being preferred) instead of one, as is commonly adopted. On the upper part of the sling of the yard a tie-block is fixed, through which the tie-chain or haulyards is or are rove, and on each side of such tie-block a block is fixed, nearly the same size as the tie-block, through which the reefing ropes or chains are rove over a plain sheeve for the purposes of rotation; these two chains also reeve through two cleets, having sheeves at the mast-head, one on each side of the tie-sheeve. Underneath the topsail, or any other yard, an iron or other bar is fixed, which is suspended at each bound or end of the yard by two axes, between each of which axes a studded sheeve is fixed to the iron bar or tube or roller, so formed as to cause the bar to revolve when acted upon. Rotation is produced by merely hoisting or lowering the yard, and the weight of the yard is a means, in proportion to its increased weight, of aiding in more speedily reefing the sail. The rotation is produced as follows:—As before described, the yard is fixed, as in ordinary ships, at the mast-head. Sheeves (three being preferred) are all made to reeve fore and aft; in each of the sheeve-holes a distinct piece of chain is rove, from whence they descend to the yard; the middle one is used as a tie-chain, and the other two as reefing-chains. The tie or haulyards is or are rove from aft forward down through the tie-block on the yard, and the end is fixed by a shackle and bolt to the middle of the fore cross-tree at the topmast head. The reefing chains are rove from aft forward, brought down to the two blocks, one on each side of the tie-block, and rove one in each of them, and taken out along the surface of the yard to the foremost of the two reefing sheeve-holes at the bounds or end of the yard; it is then passed down through such sheeve hole, and up through the after sheeve hole, the bight of which chain is allowed to bring itself in the studded sheeve fixed to the end of the roller; then it is passed in again along the surface of the yard, and down through a sheeve in the rolling block of the yard on each side of the tie-block; as there are of necessity two reefing chains, and these two chains are also the furling chains, both ends of both these chains being made fast on deck, the sail being sheeted home the haulyards are hoisted, and the revolution is produced by the action of the two chains simultaneously acting on the two sheeves fixed to the roller, and without further trouble the sail ascends and unfurls itself to its fullest (or any lesser portion) of its extent; and when the haulyards are let go, the sail descends and reefs itself, in part or to a close reef, as required. To furl the sail, it is only necessary to let go the fore end of the reefing chains and haul in the after end. This same process of reefing and furling applies to all the square sails of a ship or vessel, and in the case of fixed yards

(such as lower yards) the process is completely performed to its fullest extent by pulling on one end or the other of the reefing chains, they being fixed in the same manner as on the top-sail yard. The use of clewlines, reef tackles, reef points, reef cringles, reef earings, buntlines, gaskuts, and all blocks at present in use, for the purpose of furling or reefing sails are dispensed with, by which a great saving is effected and all chafes removed off the sail. A permanent or fixed coat of painted canvas or other water-proof material should be placed on the fixed or upper yard, that shall at all times keep the sail dry (provided it be dry when furled). The top-gallant sheets are rove as at present in ships, and the top-gallant and top-mast studding-sail booms are placed on the yard, as in common use. For the leaches of the sails, flat rope is used, as is now employed for coal-pit purposes, but this is not essential; and the ordinary square sails may be bent to the yard and roller, only requiring to be deprived of all blocks, ropes, reef points, gaskuts, &c., heretofore employed.

30. Patent Marine Cement, for preventing the Inside Corrosion of Iron Ships; Westwood and Baillie. Exhibited by W. Day and Co., Bow-road.

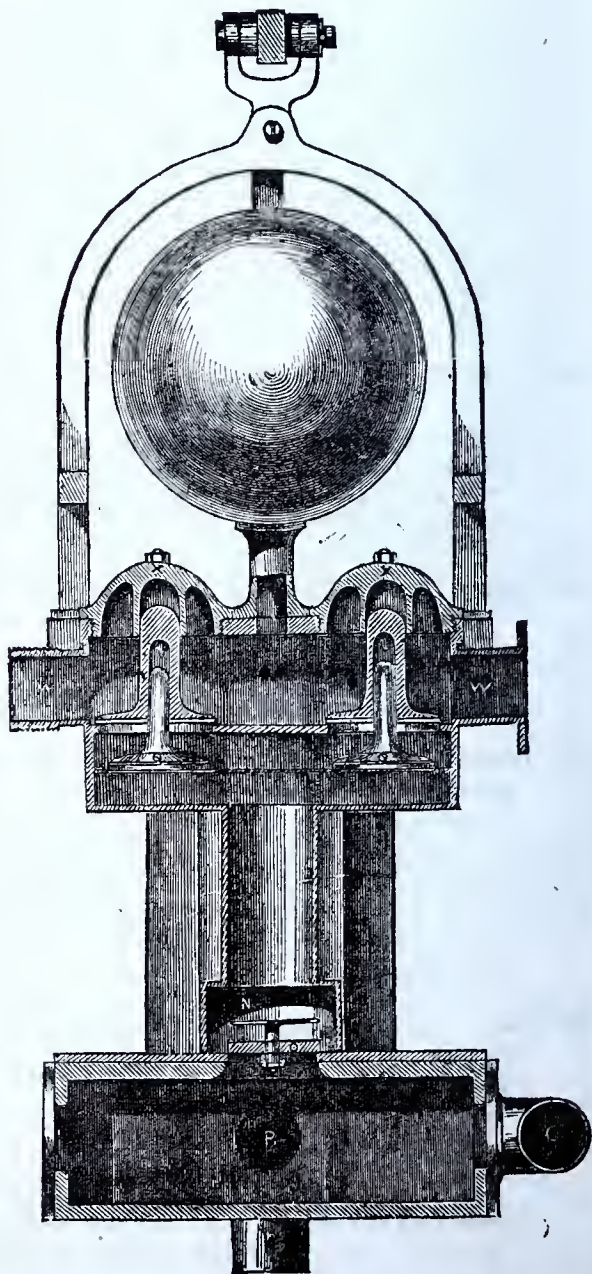
This specimen of the cement is applied to one side of a small piece of iron, the other side of the iron being left uncoated. It is then put into a small jar, and partly immersed in water containing a solution of loaf sugar and common salt, to produce acids without discolouring the water when first put in. Every iron ship carrying cargoes of sugar or salt has the same acids, and often other acids from guano, cattle urine, coal dust, &c., which mix with the bilge water in contact with the metal, when a chemical and destroying action ensues, even where the bilge plates and rivets are painted over about once a year. The action of the acids in the jar on the uncoated surface of the iron, gives off oxide of iron, which may be seen by the rusty colour of the water, and in hot weather by an effervescence on the metal, whereas on the side coated with the cement the acids are proved to be harmless, and the surface may be cleaned like enamel. This cement supersedes painting, and lessens future repairs, while its durability makes it cheaper than paint. It requires about five hours to melt to a hot lava state (in portable cauldrons for that purpose), and is applied after a preparatory coating of patent composition over a clean and dry surface. The best time for coating is when new vessels are rivetted, and caulked before or after launching. Other vessels are coated in wet or dry dock instead of being repainted. The specimen of iron plate was taken out of the Peninsular and Oriental Steam Navigation Company's ship *Haddington*, when forty new plates were put in for repairs of corroded plates. This piece of plate shows the chemical and destructive effect of acids, together with the two-and-fro mechanical action of the bilge-water in wearing away the plates and rivets of an iron ship. One of these plates, 7-8ths thick, may be seen at Lloyd's Surveyors' Office, with a large hole corroded through the metal. The *Haddington* had been covered in some parts with Roman cement and bricks; the Roman cement having decayed into a wet mud-like state, had to be all taken out. The Patent Marine Cement, as shown on

the specimen, was then coated over the entire bilge surface in 1855. On the ship's return from Bombay, in November last, the following report was made thereon:—"The result of the application of the Patent Marine Cement appears to be quite successful, as on a careful examination it was found to be quite clean and hard, and did not exhibit any signs of alteration or decay." It has been applied to ten of the Company's vessels, and all the others are to be coated as soon as ready.

***31. Patent Ships' Pump and Fire-Engine; A. P. How, 81, Mark-lane.**

In the accompanying illustrations, Fig. 1 represents a transverse section of the patent pumps, and Fig. 2 a sectional elevation. These pumps are double acting, and are so arranged that two double-acting pumps occupy but little more room than one single-acting pump of the ordinary construction. As space will not here permit

Fig. 1.



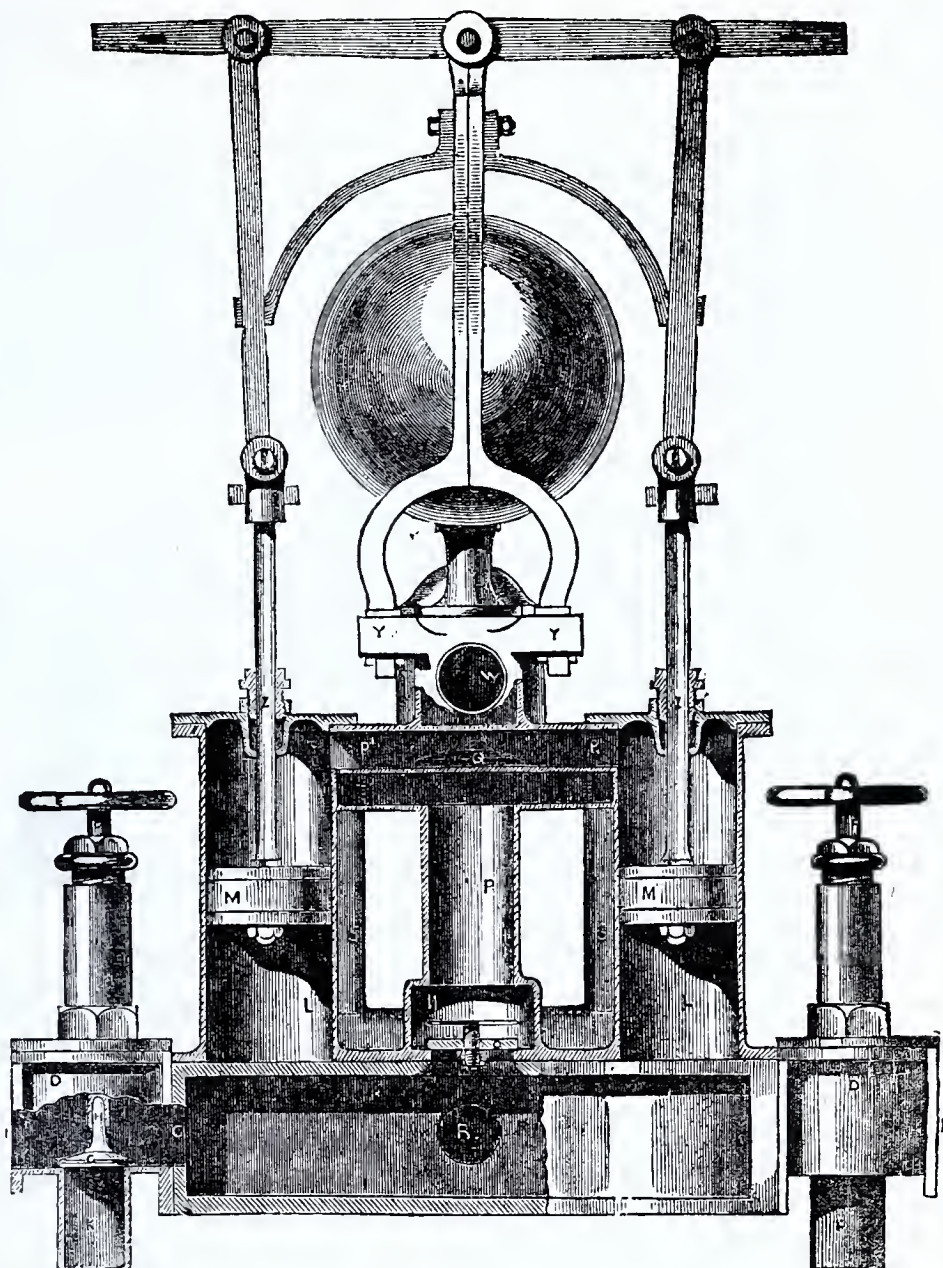


Fig. 2.

32. Patent Double Action "Twin" Pump: W. Roberts, Millwall.

a full description of the mechanical arrangements and action, the reader is referred to the numbers for November 1st, 1856, of the *Civil Engineers' Journal*, the *Artizan*, the *Mechanics' Magazine*, and the *Mercantile Marine Magazine*. These pumps are simple in construction and detail, the suction chamber forming the foundation being cast in one piece, either of brass or cast-iron, the pump chambers, suction and delivery passages being also one casting. The facility with which the valves may be examined, only requiring the cap to be unscrewed from the valve-box, the valves being under immediate inspection, as they are placed at the top, is also an advantage. Five valves only are required, thereby causing a great saving in weight of material and cost of workmanship. They are particularly valuable for vessels on account of the great power they possess for throwing a large volume of water with unusual rapidity, in case of fire, and on account also of the small space they occupy. The advantages are similar when applied to land fire-engines, for which they are equally well adapted.

This machine is composed of two double action pumps, working with one set of valves, four in number, the valve chamber being cast in a piece with and between the cylinders, so that it occupies scarcely any more room than a common pump, and by removing the air chamber there is free access to all the valves. The sole plate has the suction chambers cast in a piece with it, and each chamber being in communication with a different compartment, by turning the plug in the centre, communication is instantly made with the pump and either compartment, or shifted from one compartment to the other at pleasure, and if the plug be placed so that the port communicates with the sea cock and main hole, and a few strokes be given to exhaust the air, it then becomes a syphon, and any quantity of water can be run into a ship without the labour of pumping. Being very compact and powerful, it is well adapted for fire engines, pumping, and other uses.

32A. Suction Plate: W. Roberts, Millwall.

This is a modification of the suction chambers mentioned above, and is intended to be used with common pumps. It is compact, easily shifted, and certain in its action.

33. Patent Double-Action Centrifugal Pumps; Gwynne and Co. Essex-wharf, Essex-street, Strand.

Fig. 1 is an end elevation partly in section, and fig. 2 is a cross section of the pump.

FIG. 1.

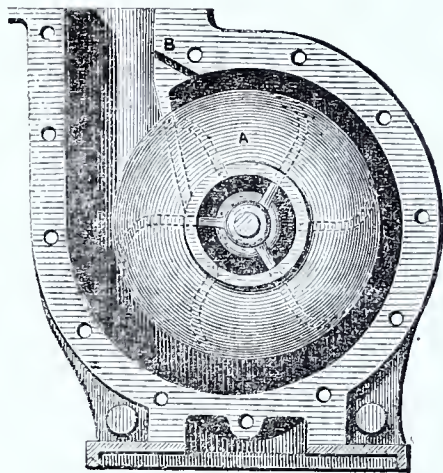
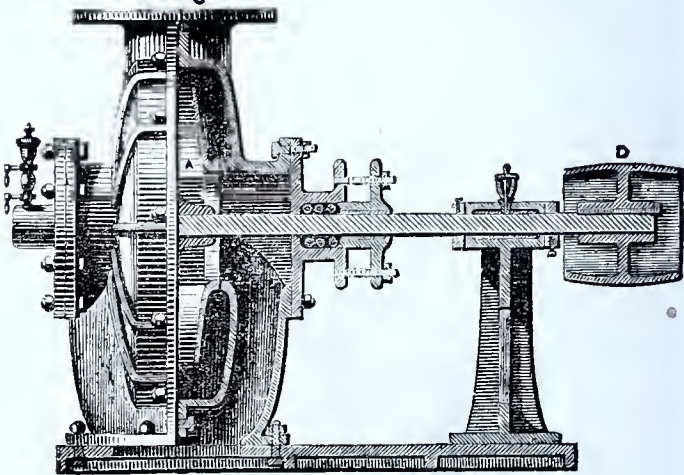
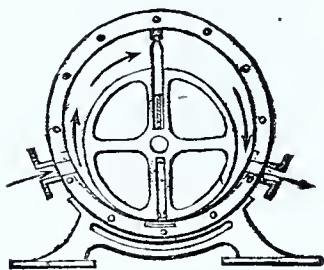


FIG. 2.

**34. Patent Revolving Pump; A. Parsey, Great Scotland-yard.**

The easy action of these pumps, and the continuous flow of water from the revolving motion, renders the discharge equal to a double-action pump. The simplicity of the working parts, all being metal to metal, and no packing or leather used, no valves required, and the being lifting and forcing pumps combined, are important advantages.

35. Patent Chest or Box for the Preservation of Life and Property at Sea; John Banks, Kerr-street, Northampton.

This invention is adapted in every respect for the purposes of an ordinary clothes-chest, but may be easily and speedily attached to the person and made available as a life-preserver. It can be so attached by the person himself. The boxes around the cylinder through which the body passes may be screwed down water-

A is the disc or revolving wheel, keyed fast on the spindle, on the end of which the pulley, D, is secured, and by which motion is communicated. B is the case or receiver of the pump. It works with an easy rotary motion, without valves, eccentrics, or other contrivances which consume power in friction; gives a continuous discharge of water without air vessels, will raise the water to any required elevation. It is very simple in construction, and of great durability. The large size will admit the passage of solid substances four inches in diameter, and the smaller in proportion.

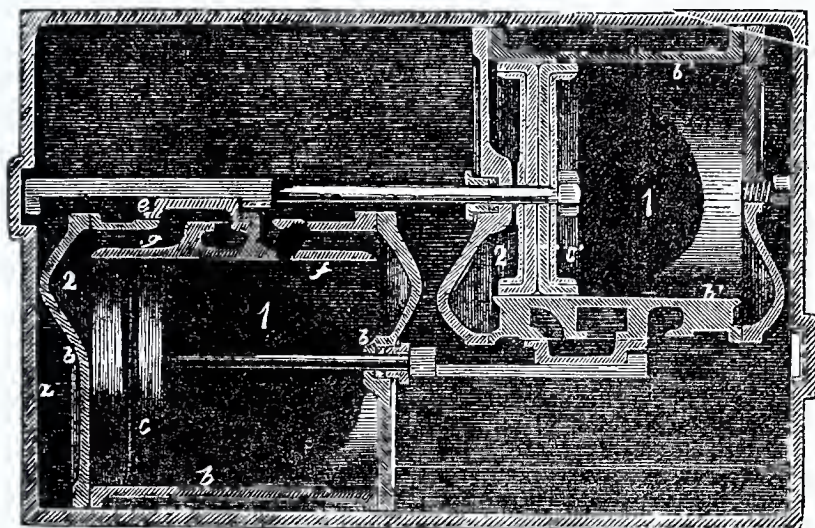
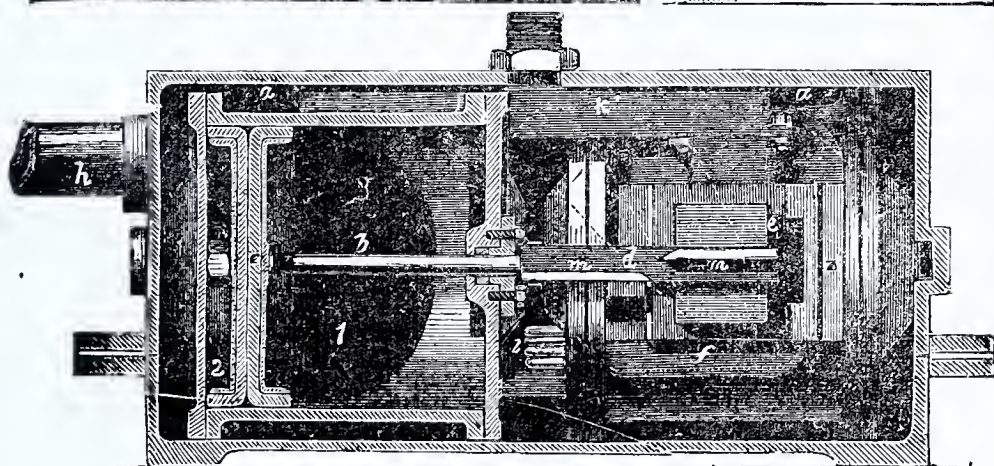
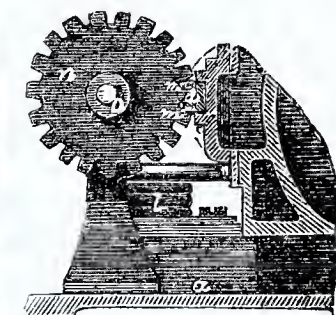
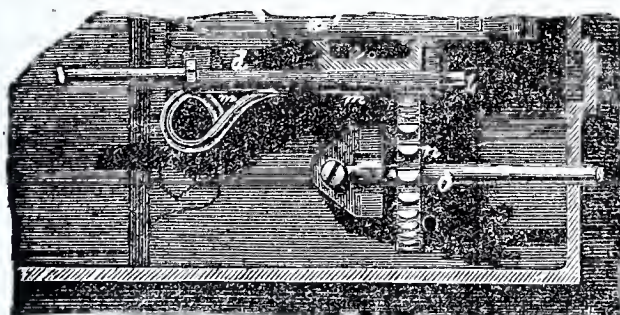
tight. It is also available for the preservation of valuable property. The two chambers being made water-tight, are well adapted to contain jewellery, books, papers, or money. The cost is but little more than that of an ordinary clothes-chest.

36. Patent High Pressure Fluid Meter: Thomas T. Jopling, Bishopwearmouth.

The principal feature in this meter is, the employment of 2 cylinders, so arranged with respect to each other, that the piston-rod of one cylinder carries the slide valve of the other, and *vice versa*; thus, making a perfect and simple meter without cranks, eccentrics, &c., and free from shock, owing to the slide of one piston being reversed before the completion of the stroke of the other; and also to the fact of each piston being allowed to come to a perfect state of rest at the completion of each stroke, so that they begin and end the stroke gently, and without percussion. The meter is placed in an outer shell of cast iron, into which the water is admitted before entering the cylinders, serving as a reservoir; and allowing for the deposit of gravel, shells, &c., which may be driven from the main, and would otherwise destroy the working parts of the meter. This is one of the principal causes of the derangement of all meters also by this arrangement nearly the whole of the pressure is taken from the working parts, and thrown upon the case, thus enabling them to be made comparatively light and compact; the working parts can be made of gutta-percha, vulcanite glass, or any other material for resisting acids, wines, &c.; the outer casing in such instances

can be made of wood, in the form of a cask, and the meter enclosed within it. Experimental meters, or meters for measuring valuable fluids where great accuracy is required, are provided

with an extra movement, and made to indicate each gallon upon the index with greater accuracy than could possibly be obtained by any other method.



- *37. Passenger Tank Locomotive Engine ; J. V. Gooch, C.E., 34, Great George-street. Drawn by William Tijou.
This engine was designed for the Eastern Counties Railway.

- *38. Express Passenger Locomotive Engine and Tender ; J. V. Gooch, C.E. Drawn by William Tijou.
This engine was designed for the Eastern Counties Railway.

- *39. Ten-wheeled Double Bogie Tank Passenger Locomotive ; Rothwell and Co. Exhi-

bited by W. and J. H. Johnson, 47, Lincoln's-inn-fields and Glasgow

This engine is one supplied to the Bristol and Exeter railway. It is very symmetrical in general appearance, being carried upon a central pair of driving wheels, nine feet in diameter, and a "bogie," or American swivelling frame, at each end, each bogie with four wheels, four feet in diameter. With these large driving wheels, each double stroke of the piston carries the engine forward 28·27 feet, so that the pistons have only to make 186 double strokes per mile run by the train. The boiler is 10 feet 9 inches long, with an internal diameter of 4 feet and $\frac{1}{2}$ inch. It contains 180 brass tubes of an external diameter of 1 $\frac{1}{2}$ inch. The cylinders are 16

inches diameter, with a stroke of 24 inches. The working steam pressure is about 130 lbs. The coke-box and water-tank arrangement of the engine are such as to enable it to run long distances without replenishing either with fuel or water. The length of the engine allows of this being provided for in a very efficient manner, and the double bogie system does away with all risk of difficulty on the ground of distance between centres. (See the *Practical Mechanics' Journal*, Vol. I., 2nd Series, p. 281, February, 1856.)

40. Patent Locomotive Engine. Sharp, Stewart, and Co., Atlas Works, Manchester.

The improvements shown in this model are applicable to every kind of locomotive engine, and interfere with no arrangement yet introduced for burning coal or any other fuel. They consist, first, in dispensing with the usual slide bars and slide blocks—the piston rods being longer than usual, and their outer ends supported by bushes, which are bolted to the cross bracket. The inner ends are supported by the stuffing boxes of the cylinders as usual. On the middle of each piston rod is fixed a cross-head, which communicates motion to the driving axle, by means of the connecting rod. By adopting this plan, and supporting the piston rod on each side of the crosshead, in guide bushes, the slide bars, slide blocks, and present expensive crosshead are dispensed with; an easy means of relieving the cylinder from the weight of the piston is insured, so that it may move truly and freely within it. Repairs of the guide motion are also greatly facilitated; for when one of the guide bushes is worn, a new bush can readily be put in, or a liner may be introduced into it. By giving the piston rod sufficient diameter, a large wearing surface in the guide bush and cylinder stuffing box is obtained, and all unnecessary weight may be avoided by making the piston rod hollow,—a matter of some importance in the reciprocating mass. This arrangement also allows from six to nine inches greater length of connecting rod. The second part of the invention consists of an improved arrangement of pumps for supplying water to the boiler. A steam pump is attached to any convenient part of the engine, to supply the necessary feed water for its regular working; there is also a supplementary engine pump, which can be coupled to one of the back gear eccentrics* when required, as in case of the steam pump getting out of order; this coupling of the pump to the eccentric can be done in a few minutes. The ordinary pumps are thus dispensed with, and when the engine is in motion, if the pump rod be disconnected from the eccentric, no part of the machinery for pumping is at work, and the engine is in consequence relieved from the friction and wear and tear of the pump rams, which in engines of the ordinary construction are going on whether the pumps are supplying water to the boiler or not. The third improvement consists of an apparatus for superheating or drying the steam before it is taken to the cylinders. The chamber for effecting this is formed in the upper part of the smoke box. The steam generated in the boiler is admitted through small holes in the upper part of the longitudinal

pipe fixed in it, and, passing down between the tube plate and a baffle plate fixed for the purpose, enters the steam chamber at that part which is most exposed to the heat of the gases coming from the tubes into the smoke box. The funnel, which passes through the steam chamber, enables the gases from the fire box and the exhaust steam from the cylinders, to escape freely, and the dried steam is conveyed from the upper part of the steam chamber through a pipe, downwards to the cylinders. The advantages resulting from this arrangement for drying the steam are,—that the steam dome and the steam tight joints within the boiler are dispensed with—the superfluous space in the smoke box is reduced, thereby diminishing the area to be acted on by the blast,—the chimney is increased in length, thus increasing the natural draft, and rendering less artificial draft necessary,—and the steam is supplied to the cylinders in as dry a condition as possible. The regulator is placed in the smoke box, in such a position as to allow access to the tubes, and can therefore be examined at any time without breaking any boiler joints. Further, when the engine is running, and the steam is passing through the chamber, a considerable quantity of heat is entering the smoke box, but when the engine is standing, no more exists than is necessary to prevent condensation; external radiation is prevented by clothing, and any little water that may collect at the bottom of the chamber is blown out through a cock worked from the foot-plate. The last part of the invention consists in making the stay bars of the upper part, or roof, of the inner fire box of rolled iron or of bent plate iron. The under edges of these stay bars are recessed, so as to reduce the surface in contact with the roof of the fire box, and the upper parts of some of them are connected to the roof plate of the outer fire box in the usual manner. By thus constructing the stays, strength, lightness, and free circulation of water are obtained.

41. Locomotive Engine and Tender; T. R. Crampton, C. E., Buckingham-street, Adelphi. (See Addenda.)

*42. Composite Passenger Carriage; J. V. Gooch. Drawn by William Tijou. This carriage was designed for the Eastern Counties Railway.

*43. The Railway Postman; A. D. Lacy, Knayton, Thirsk, Yorkshire.

This invention is designed to effect the following objects:—1st. To destroy the shock or concussion, so destructive to the valuable contents of mail bags, occasioned by the bag being thrown into a receptacle fixed on the side of the line and carriage, with great force. 2nd. To obviate the frequent repairs necessary from breakages in the apparatus, and damages to the contents of bags from mis-deliveries. 3rd. To enable bags and packages of double their weight to be exchanged with safety.

44. Patent Apparatus for Signalling between the Guards and Drivers of Railway Trains: Lot Wilks, 18, Bedford-row.

This invention consists of an arrangement of

* Neither the eccentric nor the coupling rod is shown in the model.

air chambers, with pistons working in them, fixed in the carriages and the guard's van. By lifting the piston, air is forced through a series of tubes connecting the carriages, so as to ring a bell or sound a whistle.

45. Patent Railway Chair : Munslow and Wallwork, Miles Platting, near Manchester.

This invention consists of a method of restoring the proper position of the rail when that part of the chair upon which it beds shall have become worn. To the chair is adapted a loose piece or pieces, which may be removed at pleasure. These loose pieces are formed of corresponding section to one or both sides of the rail, as well as to the bottom; the two sides, being drawn together by bolts or keys will constitute a clip, by which the rail may be grasped; or if one side only be provided with the loose piece, the rail may be forced against it by any ordinary means.

46. Z Rail for Permanent Way ; Edward E. Allen, 376, Strand.

This rail is composed of one or more parts, and the lengths connected together by suitable joint pieces, or where the rail is in two or more parts, this may be done by what is understood as "breaking joint." The rail is supported by longitudinal projecting plates, or wings, one on each side of it; these wings being in different planes on the two sides, that is, the projecting plate on one side is near the upper part of the rail, and the projecting plate on the other side is near the lower part of the rail. The rails or parts of the rails may be constructed in various forms, according to the nature of the traffic designed to pass over them. The rail may be made in two parts, precisely similar in section, which are bolted together, the two side wings giving the necessary amount of bearing surface. This method of manufacture is suitable also when transverse or longitudinal sleepers are used. It may also be rolled in one piece, being first rolled in the form of a plate with ribs upon it, and afterwards gradually bent into shape, but the bearing surface of the rail being necessarily from 12 to 13 inches, it is preferred to construct it in two parts bolted together. In these arrangements provision is made to prevent the bolt head from turning, and also that easy access can be had to the nuts of the bolts, as they are always uncovered and easily removable. In all the forms of the rails the intention is to work the flange of the wheels of engines or carriages on that side of the rail upon which the lower plate or wing is placed; this arrangement being made so as to get the upper plate as near the top of the rail as possible, just allowing for wear, as also to get the plates or wings as far distant as possible.

47. Patent Double Rails ; Thomas Symons, Flushing, Cornwall.

These rails are particularly intended for goods and mineral transport, and in order that they may be firm, the base for the tread of the wheels is extended, so that a sufficiency of weight can be placed on the driving wheels for adhesion; thus the engine runs freely and steadily at all speeds, and the brakes become more serviceable, because the wheels have more surface friction. Two rails are placed side by side, and the wheels of the engine are made of sufficient width in the tread to cover the

breadth of both rails. This is only considered necessary with regard to the engine and tender wheels, or in goods waggons having great weight to carry and requiring the strength and support offered by the double rails, as a bearing on a single rail will be ample for ordinary carriages. In laying these rails, the joint of one rail breaks joint with the other, and they also are strengthened by a rolled plate made to fit between the two rails, which plate grasps a longitudinal oak string, the whole being united by means of through bolts or trenails. These rails are placed diagonally, and can be turned and returned as the upper part becomes worn, having four equal sides. The string of wood, either of English or African oak, between the two rails, acts as a continuous fish, to give elasticity, and overcome the rigid effect which is so destructive to rails and the rolling load thereon.

48. Models showing the Modes of laying Flush Rails in Streets or Highways, so as not to interfere with other Traffic : W. Bridges Adams, Adelphi.

One mode adopted is to use the ordinary double I rail, laid on its side and bolted down to cast iron blocks at the joints through which the tie bars pass and are secured. This class of rail, being laid to the proper gauge, will serve for ordinary wheels, and the shallowness of the groove will permit them to turn out easily whenever desired, either at branches or on the ordinary road. Calculating from railway practice, the bearing surface of sleepers on the ballast is equal to two inches of width per ton of load on a wheel. Therefore the two rails laid flatwise should be equal to five tons on a pair of wheels. As the load on a highway wheel rarely exceeds thirty hundred weight, these rails will be ample. Another mode is, to use the bridge rail reversed with the flanges upwards. In this case the carriages are kept in the track by a small central flange to the tyres of the wheels on one side only of the carriage. As this flange need not project more than three-eighths of an inch, it will not prevent the carriage from being turned out of the track when required, either into a siding or branch, or into the ordinary road, and the slightly projecting flange will not damage the road for the short distances required. These rails should be equal to a load of six tons on a pair of wheels, and therefore they would answer very well for small locomotives with low wheels, capable of ascending gradients such as are in ordinary use for horse roads, at speeds, say, from six to ten miles per hour. In neither case is any timber required in the construction, and the iron rails rendered useless for the ordinary railway are applicable for these purposes.

49. Rail for Street Purposes ; William Tijou, Locomotive Department, Eastern Counties Railway.

This is a hollow-faced cast-iron rail, in which the wheels of ordinary vehicles are intended to run.

50. Patent Vice-Jaw Chairs : Thomas Wright and Co., 9, George-yard, Lombard-street.

The vice-jaw chairs are applied to wooden sleepers, the rail resting on the bottom of the chair, being firmly sustained on both sides of its

channels by the jaws of the chair, and in lieu of the wooden key the vice-jaw is placed, and secured between the channel of the rail and the inside jaw of the chair. The vice-jaw is completely dove-tailed, thereby preventing lateral action. The fastening passes under the rail and through the chair, by which means all vertical strain upon it arising from the weight of the train and pressure of the rails is avoided, inasmuch as the fastening and the rail are not in contact with each other; the fastening simply retains the vice-jaw in the channel of the rail, and upon its bearings, and the head of the fastening fitting into a groove in the vice-jaw, prevents it from moving endways upon its seatings; thus derangement and accident from shaking loose are impossible. No. 1 is a joint chair; No. 2 is an intermediate chair, with one fastening and a loose jaw, which, similarly to the joint chair, dispenses with both wood and iron keys, and supercedes bolts passing through holes punched in the rails, which holes much weaken and damage them.

51. Patent Bedplate Solid Sleepers and Rails for Streets and Roads; Thomas Wright and Co., 9, George-yard, Lombard-street. No. 3 is a double grooved combined solid rail and sleeper, adapted for metropolitan streets, &c., and it is proposed to lay them down flush with the surface. They are double guarded, answering the purpose of both guard and check rails, as well as preserving the cavity in which the flanges of the wheels revolve, and the sleeper and rail are combined in one solid piece of iron, which gives great strength. They are blocked in with the paving stones, and being ridge or edge rails, slightly elevated from the ground, are maintained as dry as possible. No. 4 is a single grooved solid combined rail and sleeper, which can be used similarly to the preceding one, being blocked in with the paving stones or macadam; it is single guarded, and has one groove in which the flanges of the wheels revolve, while a wrought-iron, l-shaped tie-bar fixes the gauge as well as the end of the sleepers. No. 5 is an iron combined solid sleeper and rail. No. 6 is a wrought-iron tyre-bar double grooved rail, applied to longitudinal wooden sleepers, and being double guarded, it is protected from the blows of passing vehicles, and can be used either side inwards. An iron joint plate unites the ends of the rails, while a tie-bar secures the gauge connecting the sleeper together. No. 7 is a wrought-iron tyre-bar single grooved rail, applied to longitudinal wooden sleepers; it is single guarded, and the space between the tracks is filled in with paving stones or macadam.

52. Patent Compressed Trenails and Keys; Ransomes and Sims, Ipswich.

53. Patent Collapsing Head for Carriages, invisible when not in use; James Rock, Junr., Hastings.

This invention is intended to supply a ready means of converting an ordinary open carriage into a close one, on the instant, in case of sudden rain or cold, without imparting a heavy appear-

ance to the carriage in its usual form. The patent collapsing head is applicable to all kind of open carriages, either by itself forming covering for two or four persons as required, or in addition to the common half-head. In the latter case it is used to make the carriage close for four persons, and when not wanted as covering, serves, both in use and appearance, for the usual folding knee-flap. The models show the application of this invention to a barouch and to a dog-cart or phaeton.

- *54. Patent Saloon Omnibus; J. B. Lyall. Exhibited by F. W. Campin, 156, Strand.

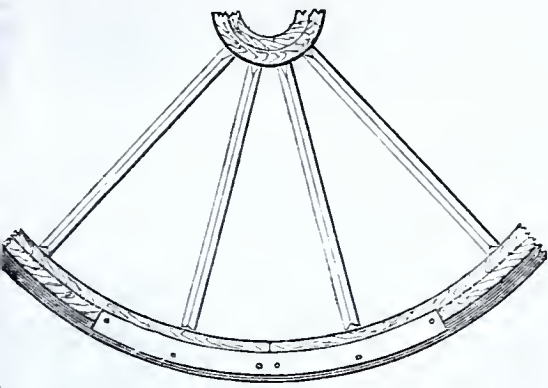
This invention consists in arranging outside seats on the roof, so as to seat passengers face to face with their feet in the foot-place or depression in the roof which reaches from the back to the middle of the vehicle, being there supported by a centre pillar inside the omnibus, access to these seats being rendered safe and easy by hand-rails and step-pieces placed across the panelled space between the two doors of the vehicle. With regard to the inside passengers, one is seated near the back of the omnibus in a separate compartment, having one door appropriated solely to it. Of the remaining passengers, four are seated on the central longitudinal seat, four are seated on one side of the saloon part (that is the part nearest the driver), three on the other side of the saloon part, and one at the end of the omnibus. The seating space is some inches wider than in the ordinary omnibus, but owing to the barouche shape of the front part (on the risings of which inside seats are placed considerable look or turning space is obtained and high fore-wheels, which will diminish the horse-draught; a commodious saloon is thus obtained, and the body of the carriage widened without extending the track of the wheels. The majority of passengers will enter by the near side door, whereby the necessity for stepping into the wet may be obviated. There is a alarm to stop the conductor, and an umbrella stand to keep the wet umbrellas out of the way. The drawings show an external side-view and an internal view of the omnibus.

55. Carriage Wheel Nave; G. G. Stokes Sevenoaks.

The invention (of which a model is exhibited) consists in the box being on the inside end sunk in two recesses, or rabbets, one without the other, round the centre hole, or box, the uppermost one for the reception of a collar fixed round the axle arm, and the outer one to receive two half-circle plates against the collar, which after the wheel is put on, are put into the recess against the collar, which keeps the wheel safe on, the cap itself being tapped on the inside to screw on to a corresponding thread on the outer surface of the end of the box; thus the use of linchpin, outer nut, or screws on the inside to keep the wheel on, is dispensed with, and all is clear and compact. Provision for the oil is made by the axle arm being shorter than the box (the box not being bored through). A space or receptacle is thus left to contain the oil which supplies the wheel.

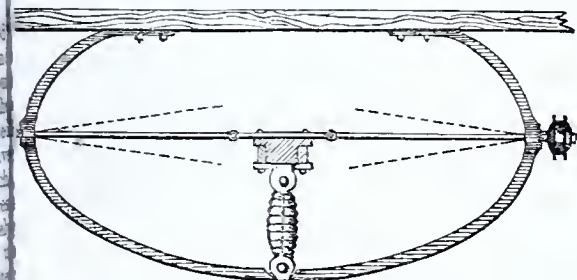
56. Patent India Rubber Wheel Tyres; W. C. Fuller, 2, Bucklersbury.

The improvement in these tyres consists in the combination of canvass or other fibrous materials with the india rubber in such a manner



as to prevent its elongation and consequent liability to become displaced when in use. They are fixed, in some cases, by vulcanising on to the metal surface, and in others by projecting side flanges, as shown in the accompanying illustration.

7. Carriage-Wheel of Improved Construction, showing the Application of Holmes's Patent Tyre; exhibited by H. and A. Holmes, Derby.
8. Board with Specimens of Patent Tyre of different sizes and forms; exhibited by H. and A. Holmes, Derby.
9. New application of Fuller's Patent India Rubber Suspension Springs; W. C. Fuller, 2, Bucklersbury.
The suspension spring is applied in this instance by means of a strong scroll iron passing underneath the axle, which is held in place by the tension of two india rubber rings, working on oscillating plates at the end of two horizontal tie-rods. By means of the screws, a strong pressure is put upon these rods, which are made to regulate the perpendicular action of the spring. (See the *Engineer*, July 11, 1856.)
10. Specimen Horse-Shoe, fitted with screwed and pointed chisels, and with flat-headed screws, to be used alternately, as the roads are slippery or otherwise. Also, a Set of Tools for preparing them; exhibited by H. and A. Holmes, Derby.
If this arrangement be adopted, there is no necessity to remove horses' shoes to "sharpen them."
1. An Improved Pillar Rein, for Stables, &c.; exhibited by H. and A. Holmes, Derby.



62. Stand for holding a Saddle to dry the Pannels in the sun or before a fire; Exhibited by H. and A. Holmes, Derby.
63. A Selection of Photographs of Carriages, taken by Arthur Holmes; exhibited by H. and A. Holmes, Derby.
64. Improvements in the surface ornaments of Carriage pannels: Hooper and Co., 28, Haymarket.
This specimen shows a further improvement in this kind of manufacture, representing interlaced *cane-work*, the first importation of pannels worked to represent interlaced basket-work, having been made by Hooper and Co., during the Paris exhibition of 1855. In those, the appearance of interlacing was only horizontal, in this specimen it is also perpendicular, with cross interlacings at an angle of 45° right and left. The advantage of these panels consists in their durability and the ease with which they are cleaned, besides effecting a saving of time in the construction of carriages with ornamental panels.
65. Patent "Versabilis" Perambulator: James Clifton, 541, New Oxford-street.
By this invention facility of motion is given to the fore wheel, which allows the carriage to be turned round, or aside, without bearing up the front, so that the most crowded thoroughfare may be threaded with certainty and safety, and the foot passenger need never be incommoded. It is not liable to be deranged, adds but little to the cost of a new carriage, and is applicable to an old one at a very trifling expense.
66. Patent Perambulator; Charles Burton, Oxford-street.
67. Improvements for Ventilating Mines, &c.; George Heppell, Uttoxeter.
In this invention it is proposed that a furnace be placed at the surface, within a shaft or chimney, leading from the top of the upcast shaft instead of at the bottom, as is usually done. This chimney to be of a greater area, leaving a space from twelve to eighteen inches open on three sides of the furnace, so that the air from the workings passing up the upcast shaft comes under and around the furnace; by which plan a greater amount of rarefaction takes place, so that the power is considerably increased. The furnace grate to be not less than fifty to sixty feet area, except in cases where the workings are limited. As an auxiliary to the furnace, the inventor proposes a new plan of cage ventilation, to the power of which he considers there is no limit. He proposes to make the shaft or shafts air-tight, and to make the cage used for the transit of mineral to fit the same. In the top of the cage, as shown in the illustrations, he proposes to place a valve, A, fitted with a balance-weight. A hole to be made in the bottom of the cage as large as possible. At the bottom of the shaft within the headway, he places a valve, B, or door, also fitted with a balance-weight. On the cage ascending, the valve or door in the headway will shut in behind it. The valve on the top of the cage being open allows the air freely

air from the surface, so than on the cage descending, a body of air is forced into the working at the rate of twelve to fourteen miles per hour, or more if required. Figs. 1, 2, 3, 4, 5,

and 6, refer to plan No. 1, by which air is forced down the shafts. Figs. 7 and 8 refer to plan No. 2, in which the air is drawn from the shafts. It will be readily understood that b

Fig. 1.

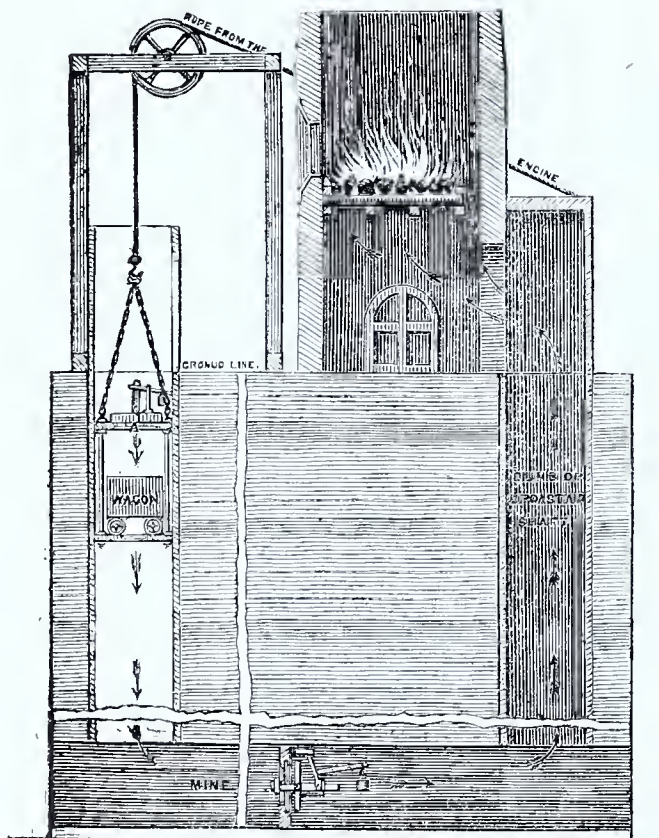


Fig 2.

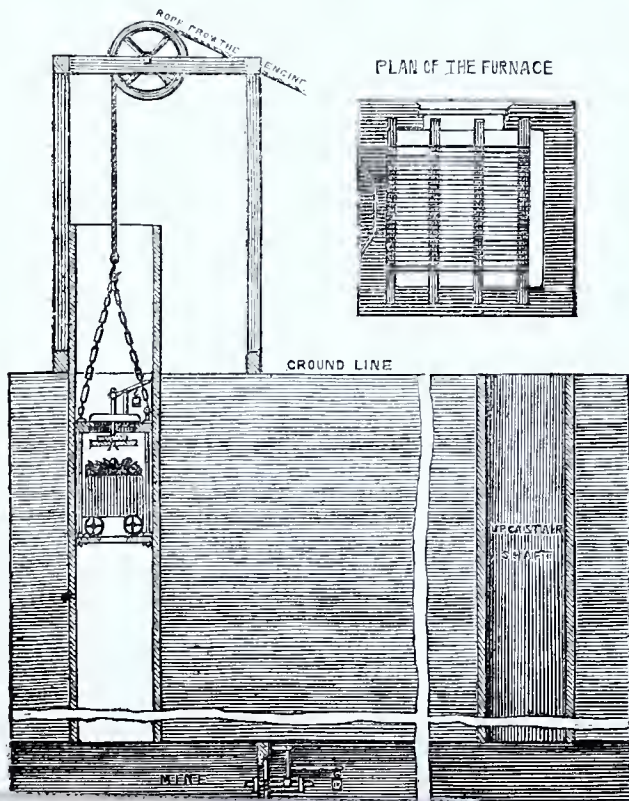


Fig 3.

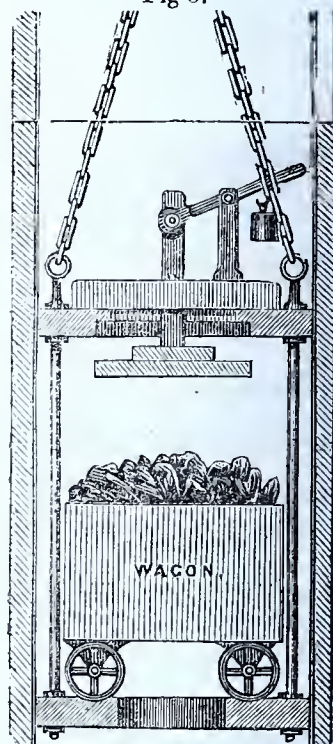
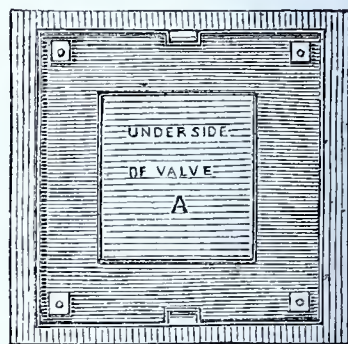


Fig 4.

PLAN OF UPPER PART OF CAGE.



PLAN OF UNDER PART OF CAGE.

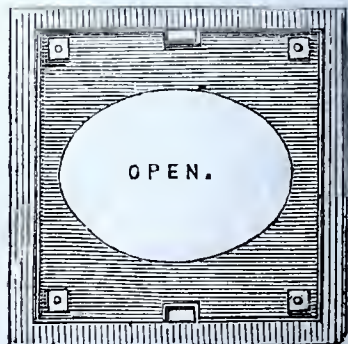


Fig 5.

reversing the valves on the cage and in the headway the effect is the contrary to that above described, that is, the air is drawn from the workings. This plan may be worked in con-

junction with the furnace with advantage, where the workings are very extensive; but where they are limited, a good ventilation could be effected without the furnace.

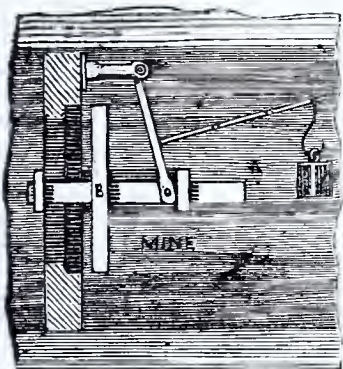


Fig. 6.

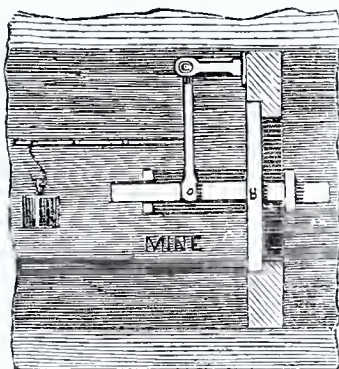


Fig. 7.

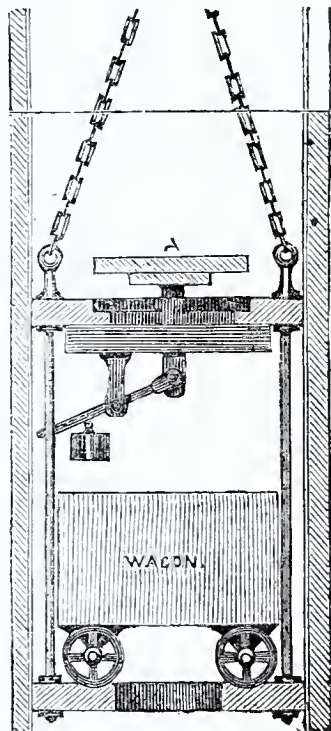


Fig. 8.

38. Improvements in Apparatus for Raising and Lowering Bodies in Mines; J. H. Van Hengel. Exhibited by P. De Fontainemoreau, South-street, Finsbury.

This invention relates to an improved safety cage, by which accidents are prevented from the cage falling down the shaft of mines or coal pits by the breaking of the rope or chain; and consists in the employment of two upright grooved rack supports, and guides placed in the shaft, and in applying to the cage or bucket an arrangement of catches and springs, by means of which, in the event of the chain or rope to which the cage is suspended breaking, it is held to the sides of the rack support.

71. Patent Apparatus for Manufacturing Coal Gas; Wm. Basford, 19, Arundel-street, Strand.

The object of this invention is to produce and purify coal gas in the most economical and simple manner, without making either tar or other ammoniacal liquor, preventing thereby the nuisance of gas-works as at present constituted. The gas, being free from ammonia and other noxious ingredients, does not emit offensive or injurious effluvia, or smoke, in combustion, thereby removing the principal objection to the use of gas in private dwellings, libraries, or picture-galleries, or for cooking and manufacturing purposes. The coke, also, made from this process is free from deleterious matters, and is of great purity, rendering it fit for domestic purposes, malt kilns, conservatories, &c. By this system the volume of the gas is increased from forty to fifty per cent., and consi-

The result of a continuous working with one D retort 12×12 produced 106,600 cubic feet from seven tons of coals, or 15,237 cubic feet per ton. The apparatus consists of an oblong chest formed into two compartments, placed one over the other, the upper one being charged with charcoal prepared under one of Basford's patents, and heated. The lower compartment receives the crude gas as it comes from the retort, from whence it ascends through the heated charcoal into the upper chamber, and passes off through the top directly into the holder, when it is ready for use, thereby saving the expense necessary for erecting the complicated purifying machinery usually adopted.

***72. Pavilion Gas Works, adapted for using his Patent Process in Parks and Pleasure-Grounds; Wm. Basford.**

This style of building is designed for the purpose of removing the universal objection to the unsightly buildings now in use for gas-works, and secures, by its peculiar construction, perfect ventilation, rendering the process of gas-making free from annoyance, and thereby suiting it to the use of private mansions, colleges, and public buildings.

73. Preserved Coal and Coke; H. W. Wood, Briton Ferry, near Neath.

These blocks are made from fresh cut small coal of known quality, which is first dried and heated. It then receives an addition of pitch in proportions to suit the nature of the coal employed in the manufacture. The small coal and pitch are then more perfectly mixed by means of a common run mill, and the

an iron mould and pressed off in the usual way. The object is to preserve coal or coke from the loss arising from decomposition, exposure to tropical rains, &c. It is made impervious to wet, and capable of exposure without injury; it is subjected to no change, whether kept in store or upon an open sea beach, and not liable to spontaneous combustion. No. 1. Block of pure anthracite coal. No. 2. A block of Duffryn steam coal preserved. No. 3. A block of ditto sawn through to show a section of the coal in its outer case wherein it is hermetically sealed. The weight, the steaming power, and every valuable property of the most friable coal is thus preserved for use in any climate, for any number of years. 4. A block of Merthyr steam coal preserved. 5. Dead small coal made into a solid block. 6. A broken block of ditto to show the fracture.

74. Patent Anti-friction Top Rollers; Evan Leigh, Miles Platting, near Manchester.

This improved roller has its bearing or journal inside; the oil is conveyed down a groove from which the journal can draw its supply as from a fountain. Instead of oiling it three or four times a day, as in the old plan, about once a week suffices. Instead of oiling the weighting hooks and end pivot, viz., three or four places, all is done in one place. Instead of the wear being thrown upon pivots, cup, bars, and weighting hooks, it is thrown upon the internal journal, which being of cast-iron, working on a cast-iron spindle, possesses considerable durability.

***75. Mechanical Washing Machine for manufacturing purposes; D. Crawford. Exhibited by Messrs. W. and J. H. Johnson, Lincoln's-inn-fields and Glasgow.**

This machine is intended for the use of manufacturers, bleachers, calico printers, finishers, and others, who wash woven goods on a large scale. The drawings represent a sectional elevation and end view of the machine. It consists of a rectangular frame fitted up with rollers, dash boards, a dashing frame, and a driving gearing. The frame is divided into a series of stories or flats like the floors of a house, each story having a dash-board floor divided down the centre. The goods in a continuous length, are passed through a ring over head, and thence down, and through a guide roller arranged so as to be directed through one end of a small outer chamber. On leaving this chamber, the course of the goods, as traced out by the arrows, is up through the bottom story of the machine, round a roller at the other end and back through the second story, passing in its course through the rollers or bars of a vertically acting dashing frame in the centre. This is continued throughout the entire series of stories, until the goods pass away at the top in a cleansed condition. Water from a series of jet pipes is plentifully sprinkled upon the goods as they run through the stories, and after each passage to and fro through the stories, the goods are directed into one of the bottom water chambers in a loose condition, to aid the combined washing and dashing process. As the central dashing frame works with great rapidity, being actuated by the duplex cone pulley movement driving a

goods are dashed forcibly on the dash floor and the cleansing is accomplished in a most effectual manner. (See the *Practical Mechanic Journal*, Vol. I., second series, page 311, Marel 1857.

***76. Steam Dash Wheel. J. Wallace, jun. Exhibited by Messrs. W. and J. H. Johnson, Lincoln's-inn-fields and Glasgow.**

By this invention the ordinary dash wheel of the manufacturer and bleacher, is converted into a complete bleaching establishment, all the operations, aided by the direct effect of steam being performed at once within the wheel's case. The drawings represent four separate views of the steam dash wheel, a side elevation, transverse section, back elevation, and plan. The wheel chamber is fitted upon a tubular shaft having a stuffing box at each end of it. Steam from a boiler is conducted by the outer stuffing box into the hollow shaft, whence it finds its way into the chamber amongst the goods and chemicals, through lateral perforations in the shaft. The opposite or inner stuffing box serves for the admission of water and chemicals intended for cleansing and bleaching the goods. As the wheel revolves, the steam, acting upon the goods and chemicals, which are of course in a state of agitation, effects the required bleaching within a greatly diminished space of time. (See the *Practical Mechanics' Journal* Vol. I. 2nd Series, page 197, Nov. 1856.)

***77. Rotatory Beetle. T. R. Bridson. Exhibited by Messrs. W. and J. H. Johnson, 47, Lincoln's-inn-fields and Glasgow.**

In the ordinary system of "beetling," or the mechanical finishing of woven goods, by a direct percussive squeeze upon the fibres of the cloth the effect is produced by an arrangement of ear hammers, which strike the cloth so as to work up the threads to the required degree of finish. The inventor of the remarkably successful "Stenter" finishing machine, has here substituted a pure rotatory motion for this reciprocatory hammering. The rotatory beetle, shown in front and side view in the drawings, consists of a triple roller arrangement, working on a mangle or calender frame. The central roller is made with alternated surface and sunk portions over its entire surface. It is cast in metal with these diamond relieve and intaglio portions upon it. The fabric to be beetled is wound upon one of the plain and external rollers, and during the process it is wound off this roller, passed round the central beetling roller, and re-wound upon the opposite plain roller. The two external rollers are kept in hard contact with the diamond roller between them, so that the central roller is thus made to exert a powerful squeezing pressure upon the fabric as wound upon the external rollers. When put in operation, the rollers are driven first in one direction and then in the other, winding and re-winding the fabric, until the required beetling effect is produced. This beetling effect is produced by the central roller, in alternating severe pressure with escaping bulges, at short intervals over the entire fabric. This invention thus effects by direct rotatory pressure what has hitherto been always done by a broken movement of

High-Speed Direct-Action Blowing Engine; A. Slate. Exhibited by Messrs. W. and J. H. Johnson, 47, Lincoln's-inn-fields and Glasgow.

High-speed, direct action, compactness, and economy, are all embodied in this blowing engine. The framing consists of a single, plain hollow cylinder, which carries everything. This is all the support which the engine has, and it requires nothing more, as it is merely the dead weight of the parts which is to be supported. The blowing cylinder is carried by pillars, on the top of the main hollow frame, and the driving steam cylinder, which, like the blast cylinder is inverted, is disposed directly on the top of the main frame, and beneath the blast cylinder. The piston of the latter has two rods connected directly to the steam-piston's cross-head, and a connecting rod from the latter passes down to the crank-shaft, which has side rods for working the valves. The engine is a 40-inch one, weighing under 13 tons; the steam pressure used is from 50 to 70 pounds, cutting off at one-third. The blast pressure ranges from $2\frac{1}{2}$ to 4 pounds. It blows 4,500 cubic feet per minute. (See the *Practical Mechanics' Journal*, Vol. I., 2nd series, page 113, August, 1856.)

Steam Hammer, with Improved Valve Gearing; W. Naylor. Exhibited by Messrs. W. and J. H. Johnson, 47, Lincoln's-inn-fields and Glasgow.

This hammer is new as regards the general design of the framing and various parts but the improvements comprehended in it have more particular reference to the valve and valve gearing by means of which it is worked. It is of the "Nasmyth" class, with an inverted steam cylinder, bolted to two overhanging standards, so that the work can be introduced laterally below the hammer block. The valve casing is cylindrical, and the valve, being balanced as to steam pressure, is most conveniently workable. (See the *Practical Mechanics' Journal*, Vol. I., 2nd series, page 169, October, 1856.)

Mechanical Hammer of Frictional Action; W. Eassie, Gloucester.

Here the hammer block is raised by a pair of nipping pulleys, which embrace the hammer rod or bar. The chief novelty in the arrangement is the action of the oscillating frame on the centre studs, by which the frictional rollers are made to nip the hammer rod respectively above and below the centres of those studs. The weight of the hammer of this tool is one ton. (See the *Practical Mechanics' Journal*, Vol. I., 2nd Series, p. 200, November, 1856.)

Patent Band Saw; Moses Eadon and Sons Sheffield.

The leading feature of this invention is, that it is manufactured without any joint, and is consequently tempered evenly throughout. It works over two pullies driven by steam-power as a band, and is most valuable in cutting curves and bends, such as have heretofore been cut by the hand and with the ordinary turning web.

Patent Dowel Box for Hand Rails, Sashes, &c.; J. J. Victory, Henrietta-street.

This invention consists of an improved clamp and guide for holding the wood firmly in its

place, and for accurately directing the bit into the end of the wood. The sides of the clamp are capable of being shifted nearer to or farther from each other, in order to receive different sized pieces of wood, by means of a right and left handed screw, tapped through corresponding nuts in the sides. There are guides projecting from each side of the box, on which the sides slide. There is a guide free to slide up and down in the box, which is raised or lowered by a screw. There are three holes pierced through the guide, which serve to direct the centre-bit into the wood, and to insure that the holes when drilled shall be parallel and coincide with the holes in the ends of all the pieces. The ends of the pieces forming the wreath, when thus drilled and fitted together, will be found to be perfectly accurate.

83. **Ratchet Braces:** A. P. How, Mark-lane.

84. **Timber-bending Machine:** The Timber-bending Company, York-road, Lambeth.

This invention consists in so conducting the process that the piece of timber is subjected to pressure on all its sides during the bending, in place of being simply bent over a form, as has heretofore been the practice. By this means the wood is prevented from swelling or bursting, as it is liable to do when bent without such support. The apparatus employed for large timber consists of a lever, which turns on a centre or axis; to the lever is attached a trough, of the curve to which the wood is to be bent, one side of the trough being moveable, so that it may be pressed firmly against the surface of the wood by wedges. Underneath the lever is a travelling table, the distance of which from the curved form can be adjusted by a screw. The piece of timber is laid on a flexible band of metal, placed on this table, and clamped down thereon, so that it is pressed upon all sides; one end of the timber is then clamped to the forepart of the curved trough on the lever, the other end of the timber butts against a block, acted on by a screw. When this is all arranged the lever is drawn down, during which operation the timber passes into the curved trough: when this is done the two ends of the wood are connected together by a tie, which takes hold of the ends of the flexible band before mentioned, the wood being still confined by the curved trough; the flexible band and the tie are removed from the machine, and are so held until it is set. The time occupied in bending a piece of timber, say 15 feet long, and 12 inches by 9 in section, is about 20 minutes. For bending small timber a much simpler machine is employed, and the pressure is confined to the ends of the piece during the bending process. In the drawing Fig. 1. is a side elevation of a small machine to be worked by manual labour, and suitable for bending small articles. The mouldblock shown fitted on the machine is for forming chair bottoms, but any other block or mould can be substituted. Fig.

is a plan view (to a small scale), of a machine suitable for bending ships' timbers and such like articles of about 16 feet long by 16 inches

square. Fig. 3 is another view of the same machine after the timber has been bent, in the form shown by detached view.

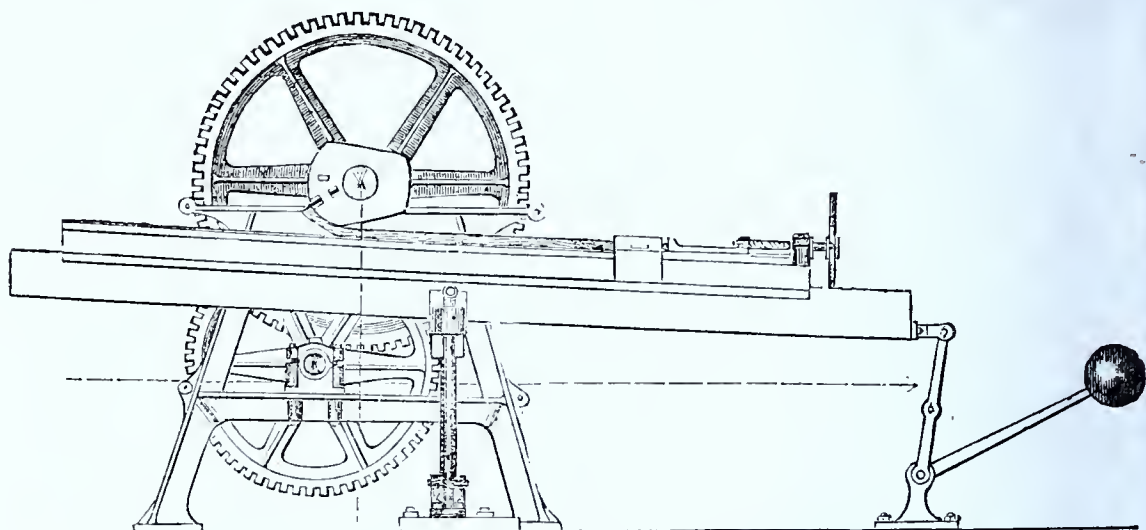


Fig. 1.

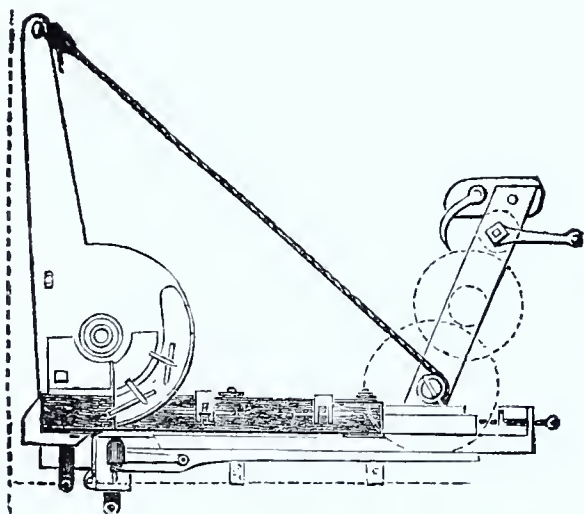


Fig. 2.

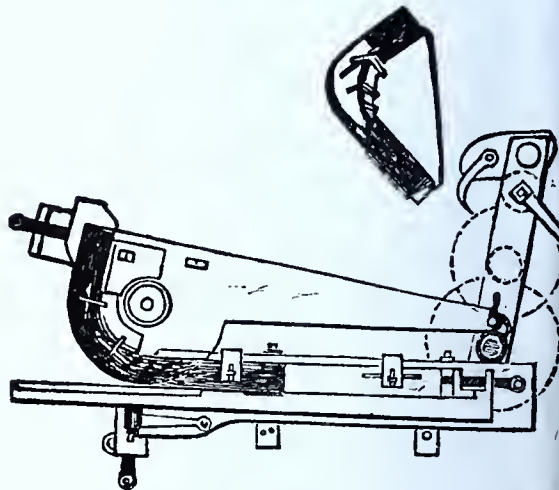


Fig. 3.

84A. Specimens of Timber bent by the Machine.

85. Artificial Stone, for grinding, sharpening, and polishing: A. Meillet. Exhibited by P. De Fontainemoreau, South-street, Finsbury.

The object of this invention is by a combination of emery and metallic substances, to produce an artificial stone for the above purposes.

*86. Sliding and Screw-Cutting Break-Lathe. Wm. Muir and Co., Manchester.

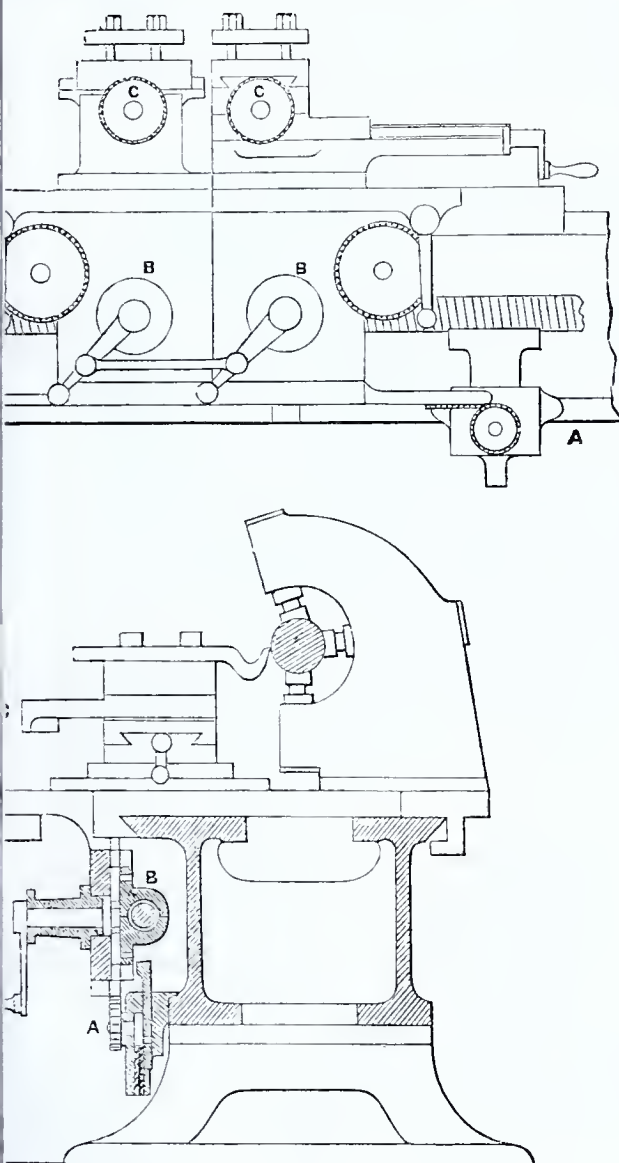
This lathe is a 36-in. centre, the bed being 30 feet long, moveable longitudinally by a screw, to admit a 10-ft. face-plate with any object to be turned. The bed has two openings, one to receive the poppet-head, and the other to receive the slide-carriage and slide-rest with tool; by this arrangement the rest does not interfere with the height of centres, and in turning large diameters up to 6-ft. the tool-slide will be steady, by the rest not overhanging, as is usual in ordinary lathes. The screw is in the centre

of the opening, and is supported on bearings the cross-ribs. The power is applied by means of gearing into the internal wheel at the base of the face-plate, which can be varied from single to double or treble gear, such gearing being applied to the front of the lathe, while the cutting tools are operating, whereby strain is taken off the bearing; the reversing motion, clamp-nut, change-wheels, & are applied as in the 12-in. lathe.

*87. Patent Sliding and Screw-cutting Lathe. W. Muir and Co., Britannia Works, Manchester.

This lathe, which is 35 feet long and with a 36-in. centre, was made for the War Department and has a new reversing motion for cutting screw or sliding right or left without changing the wheels; also a new motion for re-boring the tool for screw-cutting, two slide carriages and slide rests with a tool to each for cutting screws and sliding rapidly on adjustable stays, a clamp rest with an eccentric motion, and a new support for the screw. A, screw support; B, clamp

nut; *C*, re-boring motion, not fully shown in cut. The slide carriages have a quick return motion by hand, by means of a rack fixed to the bed at *B*, shown in the section, and worked by the handle and wheel shown in the front elevation.



Patent Self-Acting Traversing Drilling Machine; Sharp, Stewart, and Co., Atlas Works, Manchester.

This machine is adapted for cutting slots, grooves, key-beds, and a great variety of similar work, and may be made either double or single. The machine shown is single. The machines, when double, have cast-iron planed beds, on which two traversing headstocks are fitted, with as much range for each as the different lengths of bed admit of, and they receive a reciprocating motion variable at discretion within these limits. The drilling spindles working in these headstocks have self-acting feed motions, which cause the drills to descend at each end of the slot simultaneously with the reversing of the traverse motion, and revolve at speeds varying according to the diameter of the drill. The reciprocating motion of the headstocks is given

by means of connecting rods attached to revolving discs, or plate wheels, placed under the two ends of the bed, the slots in which for altering the traverse are graduated in such a way as to define exactly the length of grooves, &c., required to be cut, thus avoiding the trouble of setting out in the usual way; the speed of these plate wheels can be changed as required. The tables upon which the work is to be fitted are adjustable in all directions, so that objects are readily and accurately set, and remain so without further adjustment until the slots or grooves are completed, the tools being brought to the required position for commencing, by a nut and screw fitted to the headstocks. The slots produced in connecting rod-ends and straps, in piston and other rods, piston-rod caps and cross heads, and other objects, are more true and free from indentation on the sides, than if produced by the old process of drilling, chipping, slotting, and filing, and do not require touching with the file or any other tool after leaving the machine. By using a double machine, any piece of work can have two slots or grooves drilled in it at the same time, thus obviating the possibility of their being untrue with each other; which is the case also when cutting the key-beds of axles, shafts, &c., for which kind of work this machine is peculiarly valuable, from the exact parallelism which it insures; and in a double machine, one drill may be slotting and the other drilling, or both slotting, or both drilling, as required; and it will be evident, from the complete self-acting motion of the machine, that one workman can attend to two drills; whilst in the instance of a single machine he would be at liberty to attend to another ordinary drilling or other machine placed near. In cases where the slots are very deep they may be drilled from both sides towards the centre, of sufficient depth to meet, so as to avoid the use of very long drills, and the convenience of accurate adjustment insures the production, by this means, of a perfectly regular slot throughout. It is important to notice the form of the drill employed, which adds greatly to the speed at which the results can be produced. The machine is useful for cutting oil cups and other chambers out of the solid, whether of circular or rectangular form, and may be applied, also, for cutting grooves of spiral form upon cylindrical or other objects, for effecting which, chucks are fixed upon the tables, to which a slow revolving motion is imparted by means of a worm and worm-wheel worked by the machine.

89. The Lithotomer or Stone Cutting Machine; William Williams, Milford Haven.

This machine can be so arranged as to be worked by hand, with a small fly wheel attached to it, and can be made portable, having wheels attached to the bed, and thus can be made useful for ordinary building. Where there is a large quantity of stone work required, several machines, vertical and horizontal, worked in connection, and driven by steam-power, with extra tables, railways and cranes, may be employed. The machine consists of a traversing bed upon which the stone is placed. This passes underneath a cylinder, carrying the dressing tools, and thus the upper horizontal face is dressed. By carrying the stone forward under a second set of cutters working vertically, the

sides may be dressed, and similarly by presenting other faces, the entire block may be operated upon. The machine is equally applicable to the dressing of curved surfaces, only requiring adjustment by a handle connected with screws for lifting and lowering the cylinder, as may be seen by the model. By making the cylinders

of a different form, and setting the cutter suit the mould, cornices also may be dressed in the same manner. The patentee states that time occupied in cutting about 44 superficial feet with the machine would be only minute.

90. Improvements in Sugar Mills; C. J. Lewsey, 7, Albion-terrace, Commercial-road.

Fig. 1.

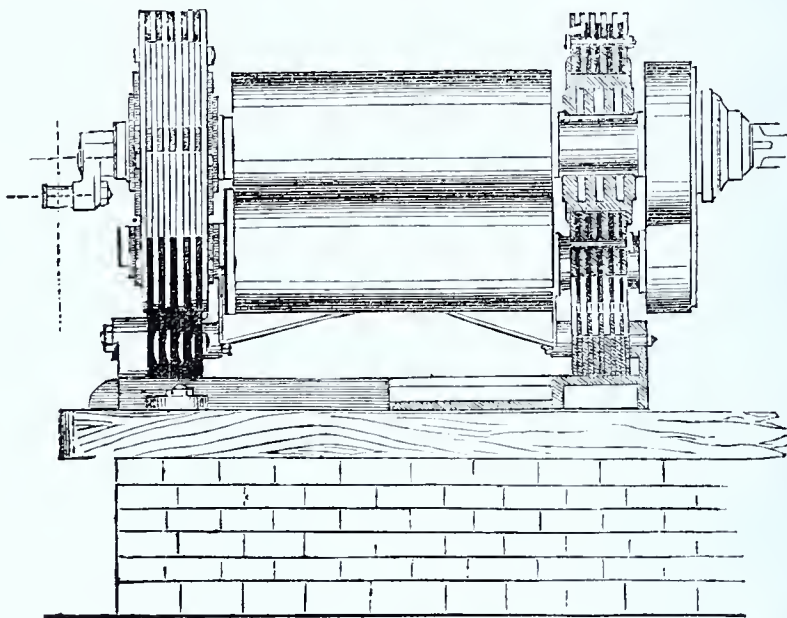
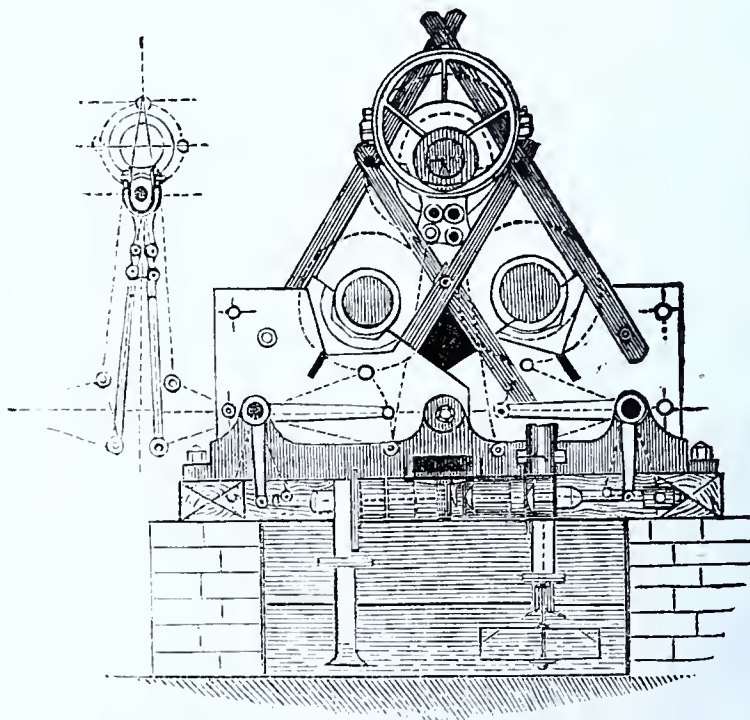


Fig. 2.



This invention consists in the substitution of wrought for cast iron in the head stocks or side frames. The liquor pump gives a continuous stream, without the use of clacks. Fig. 1 is a longitudinal elevation of the mill, showing the end elevation of standard on the fore-side, also a vertical section through the centre of the opposite standard next to the gearing.

Fig. 2.—End elevation of mill, showing a sectional and elevational view of the liquor cane-juice pump. The two buckets are represented at the extreme ends of the stroke at each end. By this arrangement it may be said a constant stream is made to pass through the barrel of the pump when at work, and without the intervention of clacks. The adjusting valve

and float allow the liquor to return when the supply is not equal to the power of the pump. By reversing the end covers and buckets the liquor may be thrown up at the opposite end, if more convenient. Fig. 3.—Second elevation through standard, showing the mode of adjustments to upper and lower rollers. Fig. 4.—General plan of the mill.

Fig 3.

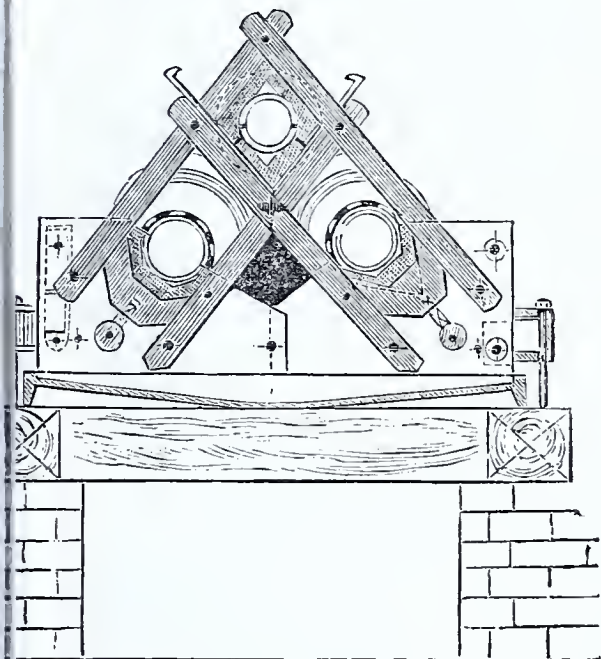
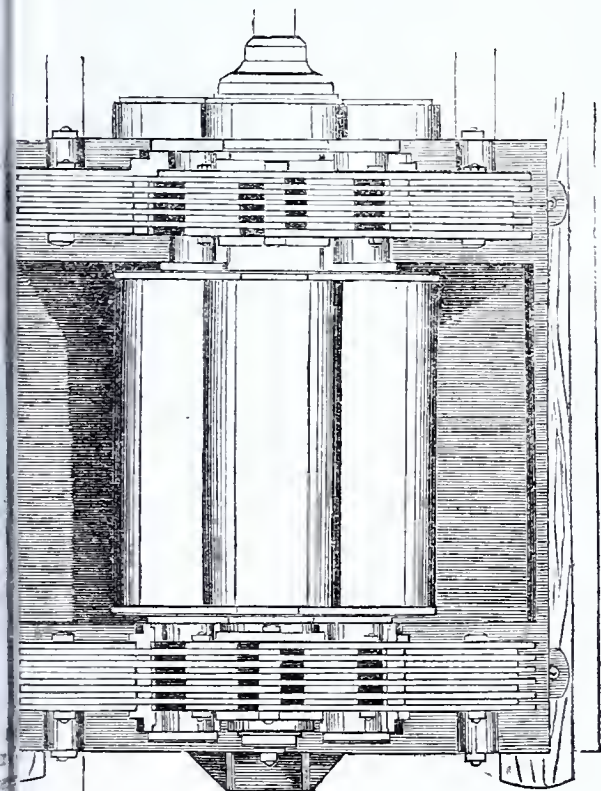


Fig 4.



- *91. Brick Making Machine; H. Clayton. Exhibited by Messrs. W. and J. H. Johnson, 47, Lincoln's-inn-fields, and Glasgow. This combined mechanical temperer and brick

moulder, when worked by a power equal to that of three or four horses, produces from 20,000 to 30,000 bricks per day. In it the pugging and moulding are simultaneously carried out, and the moulded bricks are delivered in a continuous alternate stream from the two ends of the machine. (See the *Practical Mechanic's Journal*, Vol. I., 2nd series, page 60, June, 1856.)

92. Patent Elevator and Observatory; Stocquer and Saunders, 1, York-buildings, Adelphi.

The intention of this machine is to supersede the necessity for erecting scaffolding, and it is easily managed on level ground by one man. The invention consists principally in a combination of three sets of lazy tongs, so arranged as to form the three sides of an upright triangular prism; the connection of each pair of sets of lazy tongs is effected by means of corner blocks, &c., faces of which form an angle of 60° , by which arrangement, whether the apparatus is elevated into a high prism with a small base, or depressed into a low prism with a large base, the corner-blocks constantly occupy the angles of an equilateral triangle of varying dimensions, and the figure readily passes through its successive gradations. The system of lazy-tongs above described is elevated by bringing the three lowest corner blocks towards the centre of the figure by an equal motion. For this purpose they are made to travel in three grooves, or slots, inclined to one another accurately, at angles of 120° , the grooves and the portion of the blocks within them having a dove-tailed section, which prevents the possibility of the structure falling over. A simple arrangement of three screw shafts, and bevelled wheels enables the three blocks to be brought towards the centre, by a single force applied at a winch attached to the end of one of the screw-shafts. The whole machine is surmounted by a car, into which the man steps who is to be elevated; a man of ordinary strength working at the winch will elevate the machine, with a person in it, to the height of 30 feet in three minutes.

93. Improved Apparatus for making moulds for castings; James Howard, Bedford.

This invention relates to a novel and improved mode of moulding patterns. The patterns are mounted upon a sliding mandril. A plate surrounds the pattern, of the exact shape of the profile, and when the mould has been rammed up in the ordinary manner, the mandril is drawn down by means of a screw. The mould is then free to be lifted off the plate without risk of disturbing the moulded sand or injuring the sharp edges of the impression. In the machines exhibited, which are intended to mould plough frames, the pattern is open or perforated, so as to require an inner plate attached to the outer one, both of which are stationary whilst the pattern is being withdrawn. Chaplets are also connected to the plates to form what are technically called cores. By this method of moulding, the usual processes of jointing, coring, rapping, and drawing the pattern, incidental to hand-moulding, are avoided, and so the use of skilled labour, in the production of a considerable variety of castings, is rendered in a great degree unnecessary.

- *94. Air Blast Flour Mill Grinding Stones; A. White. Exhibited by W. and H. J. H.

Johnson, 47, Lincoln's-inn-fields, and Glasgow.

The introduction of a cold air blast, between the contiguous grinding surfaces of millstones has been found very advantageous. The current of air permeates the layer of grain, from the instant that it escapes from the feed hopper until it is converted into flour by the action of the stones. Its presence causes the separation of each grain, and each partially reduced particle from its neighbour, preventing all tendency towards pastyness, and the consequent clogging of the sharp grinding edges, of which the acting surfaces of the stones are made up. It also carries off the frictional heat. It spreads the grain in all its stages of reduction thoroughly evenly over the grinding area, and it expels the finely-ground particles as fast as they are produced, leaving the larger fragments to the unrestrained action of the stones. It also increases the product of flour. In this plan, the grain is primarily crushed by a small pair of rollers, just as it is fed in between the stones; whilst cold air is effectively supplied to the grinding

surfaces, by what the inventor calls an "air distributor." When the grain is ground, it is discharged from the stones in a thin film all round, so as to insure an effective cooling of the flour. (See the *Practical Mechanics' Journal*, Vol. I, 2nd series, page 57, June, 1856.)

***95. Improved Continuous Compressing Machine; Thomas King, Spitalfields.**

This invention consists in arranging two endless perforated bands of articulated bars or links, in such a manner that whilst each works round two drums placed at a distance apart, their faces shall be inclined to each other at an angle in the direction of their length. Thus the space between the faces of the two continuous bands is wedge-like, and any materials placed between them will, when the bands are caused to move from the wide end toward the narrow end, be gradually compressed. In this way tan, hops, &c., may be readily compressed. In the drawing fig. 1 is a plan of a machine with the drums placed vertically; fig. 2 is an elevation of fig. 1.

FIG. 1

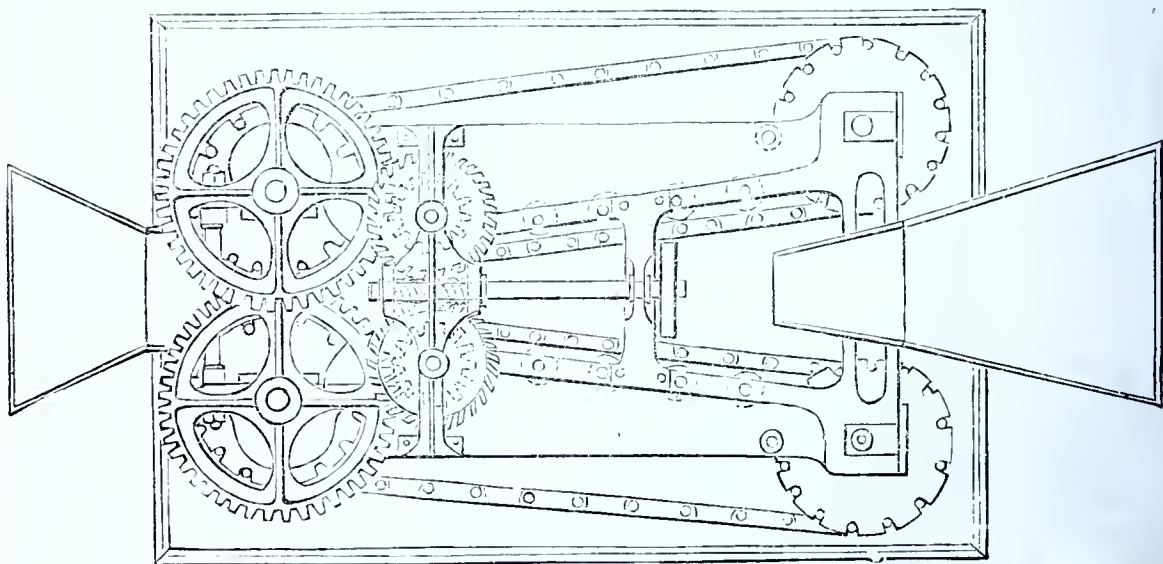
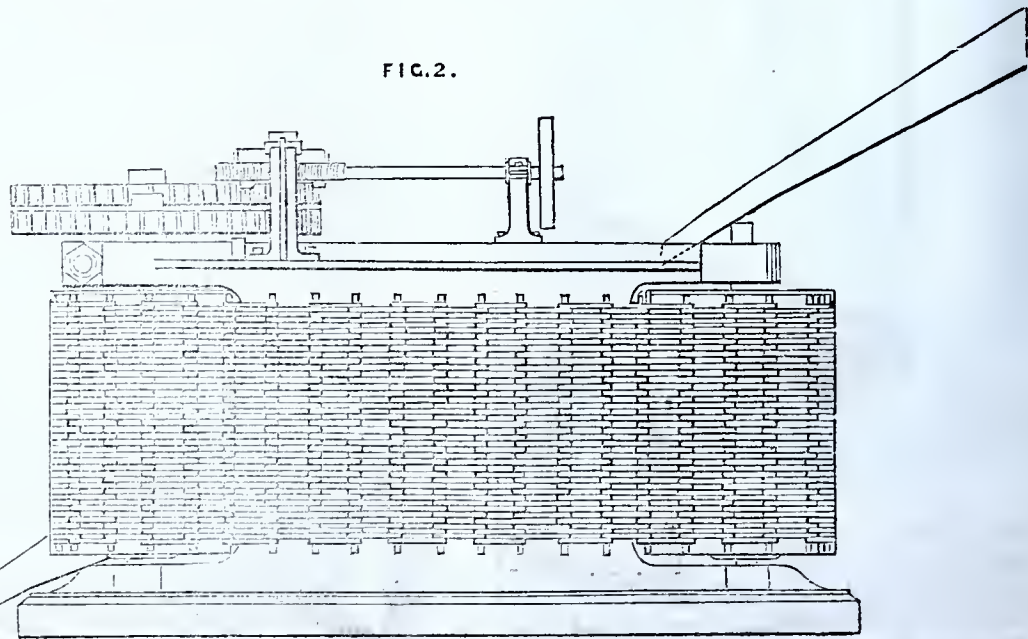


FIG. 2.



96. Apple and Vegetable Paring Machine; B. Timmins and Sons, Birmingham.

In this apparatus the apple is fixed upon a fork which is mounted on an axis carrying a screw, to which motion is given by a winch. A curved knife travelling on a guide-rod is brought into contact with the article to be pared by means of a lever working in the thread of the screw. A second lever at right angles to the arm carrying the cutting blade, traverses an irregular inclined plane, thereby increasing the distance between the centre of the article and the knife.

97. Patent Washing Machine; Charles Burton, Oxford-street.

100. Biddell's Patent Hand-Power Steel Oat Mill. Exhibited by Ransomes and Sims, Ipswich.

This Hand-Power Patent Steel Mill, uniform with Biddell's Patent Bean-Cutter, is well adapted for bruising oats for food. Its construction is very simple, and not liable to derangement. With it, one man can crush from three to five bushels of oats per hour. The roller which cuts the oats has the cutting edge of pure steel which is supported at the back by cast iron. This enables the manufacturer to harden the steel as much as can be done by fire and water, and the cast-iron not being susceptible of hardening by the same process, the toughness of the soft material supports the keen-cutting edge of the harder metal. Thus a very durable article is produced, and at a cheaper rate than could be done by the old process of making the cutting barrels of wrought iron and then case-hardening them, an operation which was attended with much risk and expense. The other process, of making them of cast iron and case-hardening them, produced an apparently good article, but a very worthless one really, as the hardening was only skin-deep, and soon wore away.

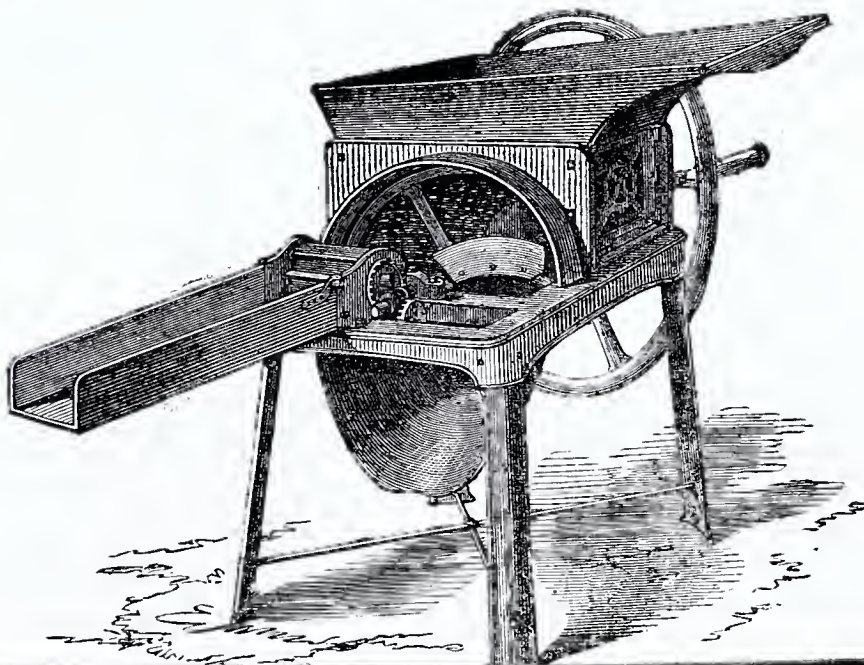
101. Biddell's Patent Bean-Cutter, exhibited by Ransome and Sims, Ipswich.

With this mill the largest and smallest varieties

of beans are equally well prepared, and this quite independently of the dryness of the grain, for, whether hard or soft, the efficiency of the operation is the same, while no choking can take place. The power required to prepare a given quantity of grain is less than with the ordinary bean-mill. The novelty of this mill consists in the teeth or cutters being made of separate pieces of hardened steel, fixed in a cylinder each tooth has three prepared cutting edges, so that when one edge, or set of edges, becomes dull, they may be taken out, turned one-third round, and put in again, and a new edge, or set of edges, is obtained; and when these fail, they may be again taken out and turned one-third round, and it makes a second fresh set; and when this third resource fails, they may be taken out and easily replaced with new teeth, by an ordinary labourer, at a very small cost. With this mill one man can cut three bushels of beans per hour. If driven by horse or steam power, at a speed of 150 revolutions per minute it will cut twenty-four bushels per hour.

102. Patent Cattle Food Preparer; B. Samuelson, Britannia Works, Banbury.

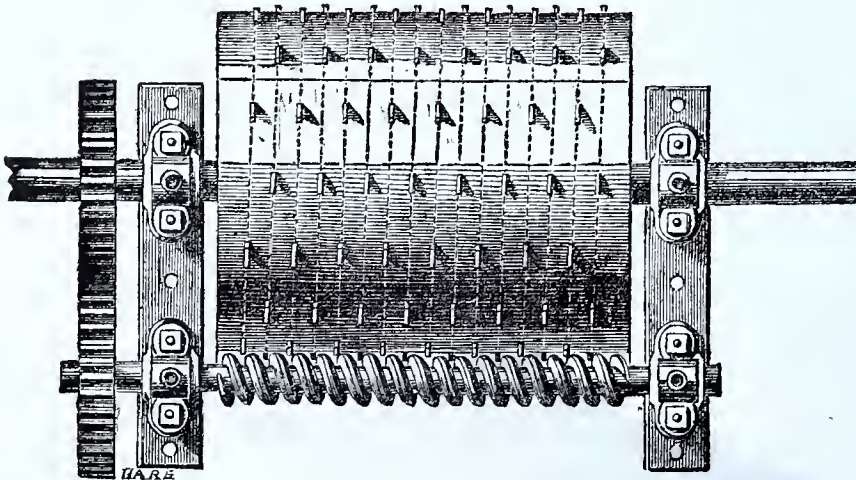
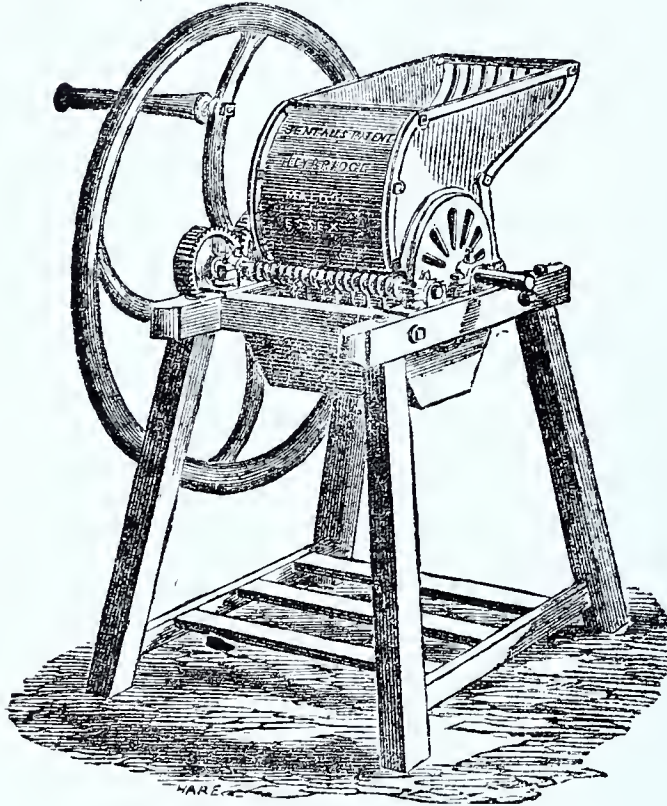
This machine consists of a combined root grater and chaff-cutter, so arranged on the frames that the cut chaff and roots are intimately mixed as they leave the knives and fall through the same spout. The mixture taking place while the grated root is in a wet state, is much more complete than if the chaff and roots are cut separately, and afterwards mixed by hand. Turnips or chaff can be cut separately if required. The machine only occupies the space of one chaff-cutter. The machine exhibited cuts only one length of chaff, but a larger size is made for horse-power (or it may be worked by a man and boy), which cuts two lengths of chaff. The chaff-cutter can be worked independently of the turnip grater, or *vice versa*. When driven by horse or steam-power, only one set of driving apparatus is required. (See woodcut.)



103. Patent Root Pulper; E. H. Bentall, Heybridge, Maldon, Essex.

This pulper has knives or hooks set in a helical form round a barrel, in front of which a worm is placed of the same pitch as the screw on the barrel; on the shaft of each a cog wheel is fixed, and these gear into each other; consequently,

when the barrel is turned, the knives on the barrel pass through the worm. This arrangement overcomes the chance of clogging, even with the hardest and toughest roots. Should an accident occur to the knives, they are easily replaced, without even taking the barrel out of its bearings.



*104. Improved Straw-shaker and Travelling Band; N. Sibly, St. Lawrence.

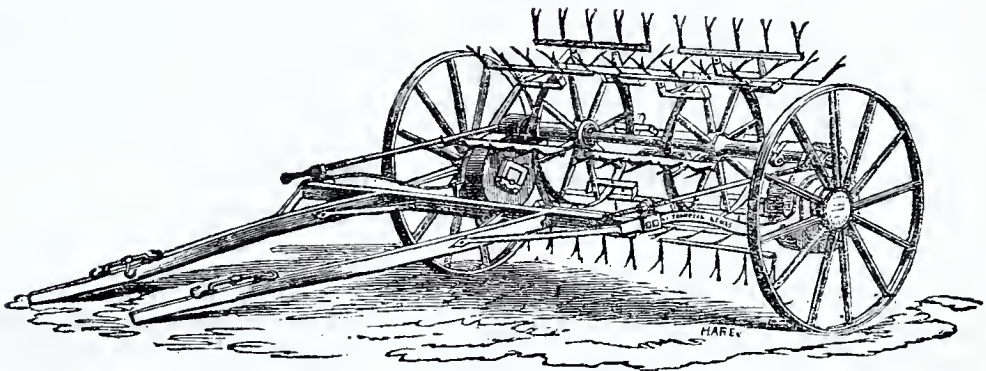
This machine consists of a frame having at each end a drum, on which are to be stretched a number of straps at suitable distances apart, two of these to be of gutta percha, of the form shown at cc, Fig. 1, having slots in them at distances corresponding with a set of teeth fixed in the driving drum at each end, so as to take into them, the sides

of the slots being increased in thickness so as to make the strap of equal strength throughout; to these straps are fixed cross stays of thin iron, of the form of Fig. 4, through which are drawn the remaining straps; by these means slipping will be prevented, a uniform motion will be communicated to the whole set of straps, and they will be kept at regular distances apart, the shaking of the straps when working effecting the separation of the grain from

the straw. The same letters refer to the same parts in the different figures. Fig. 1 is a top plan; Fig. 2 a vertical section on the line *a, b*; Fig. 3 a side elevation; Fig. 4 side view of cross stay; *A, A* frame; *c, c, c, c* drums, having flanges *c, c, c, c*, at the ends; *d, d, d, d* teeth of driving drum; *e, e*, gutta percha straps; *f, f*, cross stays; *g, g, g*, slots in straps; *h, h, h*, lining of iron at fore-end of these slots, for receiving the friction of the teeth, the ends of the lining being connected by a rivet penetrating the strap; *i, i*, remaining straps composed of tar cord; *j*, driving pulley; *k, k*, small brushes attached to the frame extending over the surface of straps, *e, e*, so as to prevent grains, &c., from being carried round between the straps and the driving drum.

- *105. Patent Prize Haymaking Machine, with reverse action: H. A. Thompson, Lewes. In this machine the improvements are—1st. The adoption of solid axles revolving in bearings. In the hay machines hitherto constructed, the travelling wheels were made with hollow naves, turning on a hollow pipe or projection on the side of the machine, which rendered them very unsteady in their work, and the projecting pipe was extremely liable to be broken off; the first improvement remedies this. By it the travelling wheels and cogged driving wheels are mounted upon, and severally keyed to, solid wrought axles, which axles revolve in bearings (as in mill or other gear-work) in the framework. In this arrangement friction is lessened, great strength is obtained, the risk of breakage entirely avoided, and the cogged gear works with a steadiness hitherto unattained. 2nd. The application of adjustable bearings. In the machines hitherto made, the distances between the parts that the driving cog-wheel and the pinion work on were fixed, and both being parts of the same casting, there are, therefore, no means of increasing or decreasing the depth to which these cog-wheels worked, and upon the slightest wear taking place they became so unsteady as to ride each other, which inevitably occasioned a breakage. By the application of moveable bearings for the above axles to revolve in, they can easily be set to the required distances, and also readily adjusted, removed, or renewed, so that after long wear

they can, in a few minutes, be re-adjusted, so as to keep the cogged wheels in their proper depth. This arrangement also materially decreases the friction in work, and that is still further reduced by the use of hard wood instead of metal for these bearings. 3rd. The form of the tine or prong, of the fork heads. The earlier machines were constructed only for "tedding," or turning over the hay; a later improvement has been made, whereby a reverse motion is given to the fork barrels to scatter the hay very lightly in the second operation of haymaking by throwing it from behind the machine instead of taking it completely over; the tine, or tooth, of the fork barrels that was properly curved to lift the hay in tedding was found useless for the latter operation, as it presented so convex a surface to the hay as to merely press it closer to the ground. Several attempts have been made to modify the form and to make it assume a more radial position, but with indifferent success, as they all impaired the efficiency of the tine when used for tedding. By the patent double tine this difficulty is obviated, and by it a perfect curved tooth is retained for tedding, together with a radial tooth, best adapted to scatter the hay in the lightest manner when used in the back action. The machine also possesses several other important peculiarities,—the framework is much improved in form, to give it greater lateral strength, and the tractive power is applied in a better position (between the wheel and gear box), to preserve the equilibrium of the machine; it has a very simple arrangement to adjust the distance from the ground, so made that it cannot possibly slip and let the machine down, and at the same time forming a strengthening brace to the frame; it can, by a very simple movement, be thrown in or out of gear or into the back action. The whole of the gear work is completely boxed in, out of the way of hay or dirt; its moving parts are all simple and so constructed as to prevent entanglement with the hay; it is stronger than any before made, without an increase of weight, and this is effected by the use of wrought iron in the fork heads, brackets, &c., thereby combining that strength with lightness of construction necessary to produce an efficient machine.



106. Patent "Percolator" Fork; E. A. Athawes, Blackfriars-road.

This fork is convex in the front; it has four tines, the two central tines projecting beyond the

two external ones, and a new and peculiar arrangement of the cross-piece or head. It is intended to supersede the use of the common hoe, and the horse hoe, which simply lighten the surface soil, whereas this instrument penetrates to a great depth.

110. Breech-loading Guns; Edward Lindner, of New York, and 56, Strand.

1. A self-loading needle revolving rifle, capable of firing twenty cartridges by the action of cocking only. 2. A self-loading and self-capping revolving rifle. 3. A breech-loading Minié rifle. The breech is self-acting, and opens on firing, and leakage is entirely prevented by the action of a ring around the barrel fitting into the breech. This gun may either be used as a muzzle or breech loader, and the breech may be opened simply by the hand or by the action of the explosive power of the gas on a small piston. 4. A breech-loading carbine, of the same construction as No. 3.

111. Improved Fire-arms; Colonel Colt, 14, Pall Mall.

This invention relates, firstly, to a novel mode of fitting adjustable sights to fire-arms, the object being to permit the shifting of the sight without varying its position laterally. The sight is jointed to the gun in such a manner that it will be held in position by friction of contact, obtained by means of a binding screw. This binding screw may be caused either to operate upon a pair of conical socket pieces connected to the arm of the sight, or it may press down the fulcrum pin of the sight arm, and cause the fulcrum end of the sight arm to bear tightly against a concentric socket formed in the gun barrel to receive it. When the binding screw is slackened the sight admits of ready adjustment, graduations being formed either on the bearing or the sight itself. Secondly, to a mode of preventing the fouling of the barrels of fire-arms. For this purpose lubricating matter is applied to the barrel or chamber containing the charges, from a reservoir provided with a piston or spring valve, for effecting or permitting of the discharge of the oil therefrom at certain intervals. The reservoir consists of a closed tube, which may be attached to a rotating breech fire-arm as an addition, or it may constitute the rammer of the lever ramrod in the Colt fire-arm. It is fitted with a spring valve or plunger carried by a central rod, which, when used, will force the valve from its seat, and open a vent for the discharge of oil on to the ball beneath. When the rammer is the reservoir the valve projecting from the end of the rammer will, when in use, come in contact with the ball, and be thereby forced back, so as to permit of the requisite discharge of lubricating material into the chamber containing the ball. The valve may be opened either by the action of the lever ramrod or by hand. Thirdly, an improvement in flasks, whereby the amount of charge may be regulated as required. Between the body of the flask and the nozzle thereof, is a sliding chamber for receiving the charge of powder and discharging it into the nozzle. The capacity of the chamber is regulated by an adjustable disc, which forms one end or side of the chamber. A coiled spring is employed for retaining the sliding parts, which compose this chamber, in the closed position, so as to prevent the escape of powder from the flask.

112. Patent Holster, Belt and Cartouche Box; C. F. Dennet, 14, Pall Mall.

The belt is made of black patent leather, and the fixture is water-proof; attached to the belt is the holster and the cartouche box. The receptacle for the caps and cartridges consists of a japanned metal box and lid, enclosed in a leather pouch, the flap of which is fitted with a tongue to button on to the stud. When the pouch is intended for the cavalry service, the suspending straps are passed through loops on the ends of the pouch, and are secured to the under side of the same by buckles. When worn by the infantry, artillery, &c., it is run on the body-belt. This belt saves man and horse no less than eight pounds in weight.

*** 113. Improvements in Projectiles for Ordnance; Joseph Roberts, 14, Vassal-villas, Holland-road, Brixton.**

The object of this invention is to explode the shell immediately it strikes the walls of fortifications, &c., without its containing percussion powder, which renders it dangerous in transportation. It is fired from a rifled cannon. When the shell is propelled by the powder, the fuze at B at the same time ignites and quickly burns to opposite the centre of the cross-hole A, a slow burning fuze filling the remaining part. The cross-hole A is not filled. When the shell is stopped in its course, the momentum of the case brings a tube, filled with powder, opposite the cross-hole A, which, being pressed forward by a spring, ignites and fires the shell.

114. Winged Conical Explosive Shell; Richard Gittins, 28, New-street, Dorset-square.

This shell is intended to be made of the size of a 32lb. shot, and may be used with ordinary guns. The nipple point is so contrived, that when it hits an object the charge explodes, and the object of the wings, which expand on leaving the mouth of the gun, is to keep the course of the shell straight as well as to cause destruction on its way.

115. Machine for Ascertaining the Propelling Force of Gunpowder; Thomas Austin, Waltham-abbey.

In this machine the proof is made with from one to two and a-half drachms of powder, propelling an ounce lead ball. One of Joyce's elastic thick felt waddings placed on the powder prevents the escape of any portion of the propelling force before the ball has left the barrel, and the whole power of the charge is consequently concentrated on the ball it has to propel.

116. Short Cannon; Captain J. Norton, Rosherville.

This cannon is without a touch-hole, and is fired at the mouth by friction. The object in view is the destruction of wild beasts. This is effected by attaching a bait to a plug at the mouth, which, when seized by the animal, causes the charge to explode.

PHILOSOPHICAL AND EDUCATIONAL APPARATUS.

120. Patent Magnetic Disperser for Chronometers : E. D. Johnson, Wilmington-square.

The object of this apparatus is to give such motion to the chronometer as may obviate the effects of local magnetism. This has been accomplished without any change in the construction of the chronometer itself, by so mounting the instrument and its gimbaling that it revolves in the planes of the balance once in twenty-four hours. In addition to the ordinary gimbaling of the chronometer, a ring of brass surrounds the same and carries the holdfast and outside gimbal screws which form the ordinary attachment to the wooden box ; in fact, the chronometer is gimballed into this ring exactly as it would be into the box.

121. Prismatic Clinometer ; W. Pole. Exhibited by Elliott Brothers, 56, Strand.

This instrument consists of a prismatic compass, with the addition of a weighted dial, for the purpose of taking vertical angles.

122. Patent Planimeter ; Amsler, Switzerland. Exhibited by Elliott Brothers, 56, Strand.

This is an instrument for calculating the areas of plans, maps, &c., with perfect accuracy.

123. Spherograph, for laying down courses in Great Circle Sailing : —. Gerard.

This spherograph has been approved by the Lords of the Admiralty. In addition to the chart, a ruler and index is employed. In using the ruler one of the corners at the end to which the index is attached, must be laid on the chart, and the other corner of the same edge on the point specified on the circumference. The ruler is then to be held fast, the nut slackened, the index point brought to the required position, and clamped by tightening the nut.

124. Patent Portable Globe ; J. Betts, 115, Strand.

This globe is composed of a steel wire frame, covered with a map, printed on cloth. A steel tube forms the axis, which is surrounded with wire ribs very slightly curved in the form of a bow, and one end of each of these is fixed near to one end of the tube. The other end of each of the ribs is attached to a slide or runner, similar to that of an umbrella. Supposing the globe to be collapsed ; in order to produce the spherical form, the slide is pressed upward along the tube until it passes the spring which retains it in this form. By pressing down the spring, the frame, from its own elasticity, immediately assumes the collapsed state, the cloth, without any assistance, falling in between the ribs. The globe exhibited is a terrestrial, of rather more than fifteen inches diameter. The frame is covered with cloth, on which a map of the world is printed, all the various colourings being produced at the press with varnish colours, so that varnish, which, by turning yellow, so soon destroys the beauty of an ordinary globe, is superseded.

125. Patent Barometers. Gwynne and Co., Essex-wharf, Essex-street, Strand.

This invention consists chiefly in supporting or balancing the instrument on points, pivots, or knife-edges, or suspending it by a flexible material, as a silken cord, a fine flexible steel spring, &c., which allows the instrument to vibrate or oscillate freely, and a pointer or hand fixed to the instrument, and moving in front of an index or dial, shows, by its motion, the most minute change in the atmosphere. Any increase in the pressure of the atmosphere forces the mercury or other fluid up the tube, as in the ordinary barometer ; this increased weight (equal to the quantity of mercury or other fluid) moved to the opposite side of the point of suspension causes the instrument balanced on its point, or otherwise suspended, to move, and the indicating hand shows the change ; a decrease in the pressure of the atmosphere affects the instrument in the opposite direction. A great many varieties in the arrangement of the instrument can be made. (See drawing.)

126. Elliptograph ; John Alcock. Messrs. Dunn, Hattersley, and Co., Windsor Bridge Iron Works, near Manchester.

127. Model for teaching perspective ; John Colson, Winchester.

This model is for the purpose of enabling students in perspective to comprehend in one view its simple fundamental principles.

128. Sectional Wooden Model Diagram of a Pump ; Arthur and James Rigg, junrs., Chester.

The size of this model is 3 ft. by 1 ft. ; the valves open and close, so that their action is clearly seen.

129. Sectional Wooden Model Diagram of Steam Engine ; Arthur and James Rigg junrs., Chester.

This model can be placed before a class either as a horizontal, vertical, marine, or locomotive engine. The arrangement and action of the slide valve, eccentric, piston, crank, fly-wheel &c., are shown. Size, 4 ft. by 1 ft. 8 in.

130. Five Sectional Wooden Model Diagrams of various Parallel Motions for Steam Engines ; Arthur and James Rigg, junrs., Chester.

The size of each is 1 ft. 9 in. by 1 ft. 3 in.

131. Sectional Wooden Model Diagram of a Corn Thrashing Machine ; Arthur and James Rigg, junrs., Chester.

This model has the beater, straw-shaker, riddle, &c., &c., complete, to show the process of separating grain and chaff from straw, and preparing it for winnowing. Size, 1 ft. 9 in. by 1 ft. 9 in.

132. Sectional Wooden Model Diagram of a Machine for Morticing and Tenoning Timber; Arthur and James Rigg, junrs., Chester.

This model is an illustration of the power of a combination of levers. This machine is in general use for making gates, doors, frame-work, &c., &c. The model is one-third of the full size. Size, 2 ft. 6 in. by 1 ft.

133. Sectional Wooden Model Diagram of a Door-lock and Key; Arthur and James Rigg, junrs., Chester.

This diagram shows the mode in which the various parts are arranged, and how the key moves the tumblers, bolt, &c., &c. Size, 1 ft. 3 in. by 9 in.

134. Working Illustration of the Link Motion and Reversing Gear, as used in Locomotive, Marine, and other Steam Engines; Arthur and James Rigg, junrs., Chester. Size, 2 ft. by 1 ft.

135. Working Illustration of the Electric Telegraph; Arthur and James Rigg, junrs., Chester.

In this model one side shows how the currents are reversed, and the other, how, consequently, signals are transmitted. The direction of the current is shown by arrows. Size, 1 ft. 9 in. by 1 ft.

136. Chemical Balance. J. Castle, 38, Torriano-avenue, Camden-road.

The top portion of the beam of this balance is horizontal instead of being constructed on the usual plan, with a double inclined plane. The object of this arrangement is to prevent alteration in the value of the divisions on the beam, when it takes an oblique position.

137. Machine for Measuring Distances; Commander Rodd, R N., Bideford.

This instrument is so arranged that the wheel which gives motion to the index pointers, also brings into action the letters T and H placed in the top of the instrument, which letters rise and fall at the completion of every ten or one hundred yards respectively, thus obviating the necessity for constant reference to the dials. The maximum distance registered by the dials is ten thousand yards.

138. Patent Micro-Photographic Reflecting Process; Specimens by W. H. Olley, 2, Brabant-court.

By this invention, the principle of which consists in the application of the camera lucida and other reflectors to the eye-piece of the microscope, the most faithful photographic representations of microscopic objects can be obtained in a few seconds or minutes; whereas, pictures of such objects taken by the hand of the artist, according to the ordinary mode of delineation, and which, at best, are but imperfect transcripts of nature, usually occupy many hours, or even days, in execution.

139. Patent Artificial Ivory Photographs: J. E. Mayall, Regent-street.

This invention consists of the adaptation of a material called artificial ivory, for the reception of the photographic image. This may be rolled into slabs of any size, which when polished have a fine texture, combined with the semi-transparency of ivory.

140. Patent Spring Camera Shutters; T. Skaife, Vanbrugh House, Blackheath.

Photographers, when attempting to photograph moving objects, experience difficulty in raising and depressing the ordinary dark slide or in removing and replacing the cap of the lens sufficiently quickly. These shutters obviate that difficulty; they are made chiefly of hard india-rubber, commonly called "vulcanite," a substance not affected by change of climate or photographic chemicals. The shutters are impenetrable to light, and combine the strength and truth of steel with the lightness of paper mæché, occasioning no perceptible vibration to the camera in their working, though fully opened and closed in the 5th part of one second, which can be done by a slight application of one finger.

141. Electro-Chemical Bath; J. I. F. Caplin, M.D., 9, York-place, Portman-square.

The object of this bath is to remove from the system any particles of metal which may have been absorbed by it. The mode of using it is as follows:—The patient is placed up to the neck in a metallic bathing-tub, isolated from the ground and made to rest in a horizontal position upon a wooden bench, the whole length of the body, which is to be also isolated from the bathing tub. The water is to be acidulated with nitric or hydrochloric acid for the removal of mercury, gold, and silver, and with sulphuric acid for the removal of lead. One extremity of the bath is put in contact with the negative pole of the pile by means of a screw, and the patient takes hold of the positive pole, sometimes with the right hand and sometimes with the left. The arm is held up by supports in contact with the seat. The extremity of the positive conductor, which the patient holds, is armed with a massive iron handle, wrapped around with linen, to diminish the calorific action of the current, which is very powerful, and which, without this prevention, would burn the hands. The patient being thus placed, the positive current enters either by the right or left arm, circulates from the head to the feet, and is neutralised at the negative pole on the sides of the bathing-tub. Being isolated from direct contact with the negative pole as well as from the ground, the electric fluid radiates from the body into the bath, forming a multitude of currents from the entire surface of the body, which, after having traversed the organs and even the bones, neutralise themselves upon the negative side of the bathing-tub.

142. Patent Pianoforte; F. Priestley, 15, Berners-street.

This invention consists, firstly, in making the action with a rocking lever or butt to each key, such rocking lever or butt being constructed with a hammer shank and hammer, and also with or without a damper, and being so shaped, and the back end of the key being also so shaped, that the pressure of the finger on the key will cause the hammer not only to strike the string but also to recoil therefrom, so as to produce a

good repeat. Secondly, in the intervention of a block or sticker between the back end of the key and the rocking lever or butt; in such case the top end of the block or sticker, instead of the back end of the key itself, being so shaped as to act upon the rocking lever or butt. Thirdly, in the use of a spring, serving not only to assist in causing the back motion of the hammer, but also to keep the rocking lever and key, or the rocking lever and the block or sticker, constantly in contact with each other. Fourthly, in supporting the sounding board and belly bridge, either entirely or partially by or from the strings, by means of the pins, and also construct-

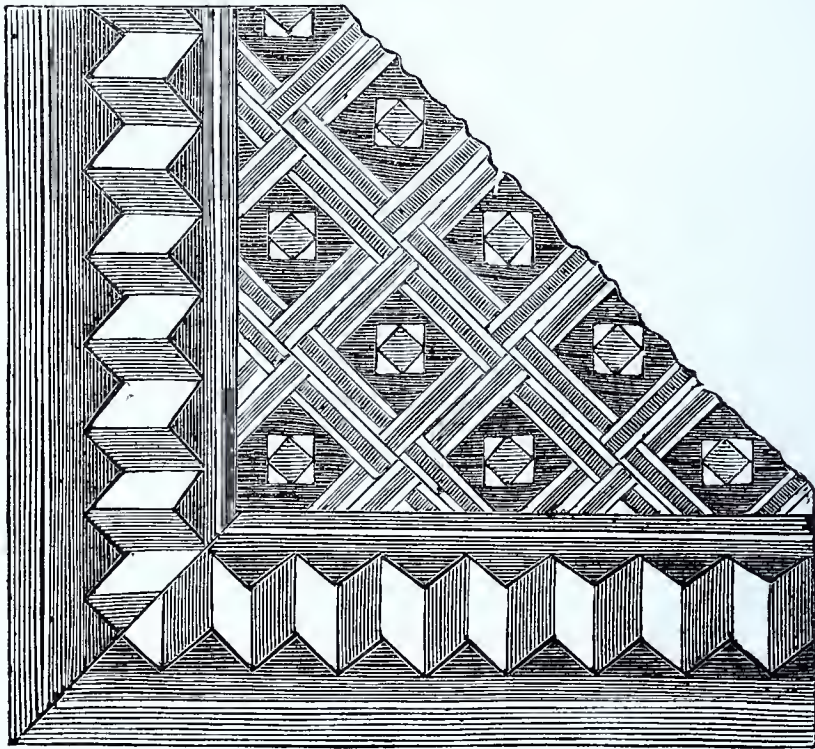
ing a belly so supported with the belly bridge disposed at or upon or so as to form its bottom edge.

143. Patent Tritio-Dactylo-Gymnast; or, Third Finger Exerciser. William Prangley, Salisbury.

This instrument consists of an adaptation of springs attached to the wrist, and held in position by finger-caps, and is intended to be worn not while practising on the piano, but at other times, so as to render the third finger equal to the others in power and activity.

BUILDING CONTRIVANCES AND HARDWARE.

146. A Specimen of Wood-Paving for Floors of School-rooms or Workshops, the Wood Bricks being laid upon a preparation of asphalte; Exhibited by H. and A. Holmes, Derby, Lichfield, and 40, Regent-street, Haymarket.
147. Specimen of Wood Inlaying; Exhibited by Edward Rea, 115, Wardour-street.
This specimen of inlaying is intended to show the effect of a combination of various woods, many of them extremely rare. It is composed of sixty-seven distinct woods.
148. Patent Solid Swiss Parqueterie; H. and A. Arrowsmith, 80, New Bond-street.



This parqueterie is made solid throughout, every portion of the ornamental woods forming the patterns, being grooved and tongued together, and firmly jointed with marine glue. By this peculiarity in its fabrication the greatest strength and durability is produced, and when applied for flooring it can be fixed immediately upon the joists, rendering under-flooring unnecessary. It is much lower in price than the ordinary veneered work which has hitherto been in use.

149. Specimens of Parquet Floors and Borders, Parquetetto Panels, and Wooden Tiles; Exhibited by the London Parquetry Company, 8, Whitefriars-street.

No. 1. Parquetetto panel, of solid yellow pine and sassafras wood. N.B.—This new kind of flooring is a medium between parquet and ordinary floors, and chiefly intended for halls, galleries, &c. 2. Parquet panel, grate pattern, in solid wainscot. 3. Diagonal grate pattern, in solid wainscot. 4. Star pattern,

wainscot plated upon pine. (See Engraving.) 5. Star of wainscot and teak, upon pine. 6. Star of wainscot and American walnut. 7. Curvilinear pattern, in wainscot and walnut. 8. Diamond pattern, in purple and orange wood (not stained). 9. Octagon star, in wainscot, walnut, and purple wood, and maple. 10. Parquet star floor or border (four panels), composed of walnut stars, divided by mahogany ornaments, and interlaced by a rich rosewood and maple chain in narrow bands. 11. Patent fire-proof parquet panel. 12. Parquet borders, in wainscot, walnut, maple, and purple wood. 13. Wooden tiles, in wainscot and walnut.—N.B. All the above, with the exception of Nos. 2 and 3, are plated (veneered) upon yellow pine, which is stated to be better adapted to the English climate than solid floors, which require to be made of wood that has been seasoned and manufactured in the same climate in which the floor is intended to be laid, having no ground-work to protect the joints from the effects of dry and damp atmosphere. 14. 15. 16. Pattern books of the London Parquetry's

designs of parquet and parquetteto floors and borders. 17. Pattern book of patent veneered wall panelling and decorations. 18. Anti-moisture paper, for lining walls. 19. Hand-

rails in sassafras wood, bent by machinery. 20. Collection of the most curious exotic woods used in cabinet-work.



150. Improved Ornamental Veneer Flooring for Sides of Rooms, Window Recesses, Halls, &c.; John C. Sikes, Chevening, Seven-oaks.

The improvement consists in making this kind of flooring in the form of whole, quarter, and half tiles, for the convenience of laying it down. It frequently occurs, in rooms where Turkey and other carpets are laid, that a very small space round the sides remains to be filled in; for this purpose, then, this kind of flooring is especially adapted. It being made in the form of whole, quarter, and half tiles, admits of hardly any waste in laying down; it is also adapted for halls, window recesses, and other like places. The specimens exhibited are for a hall, having a border similar to one worked in Minton's celebrated encaustic tiles, which has been chosen to show what variegated patterns can be worked in this kind of flooring. All that is required in laying the flooring down, is to fill in the spaces between the joists with deal boards, and then firmly glue the pieces down; the sides can also be united with glue, only taking care not to allow any glue to ooze out at the top.

151. Encaustic Tiles for Flooring; John Roberts, Upnor Lodge, Rochester.

The peculiarity of these tiles consists in their design, and their being glazed, to prevent wear and tear. The glaze also keeps them dry at all times, and renders them easily kept clean. They are indented, to prevent accident from slipping, and so constructed that they can be laid by any ordinary workman.

152. Patent Corrugated Papier Maché; Edward E. Allen, 376, Strand.

These sheets are prepared of various thicknesses, the corrugations being proportionate to the thickness of the sheets and quality of the material. They are rendered both water-proof and unflammable, *i.e.*, they can be charred but no flame can be produced. The sheets are made of various sizes suitable for the exterior walls or interior lining of portable houses, also for partition, panelling of furniture, doors, &c. They are also suitable for the sides and divisions of railway carriages, and for all kinds of roofing, the sheets being curved to any radius required. The thinner sheets are also applicable to a variety of useful and ornamental purposes.

as boxes, screens, &c., &c. The surface of the sheets may be either painted or grained, and afterwards varnished or French polished. The graining being produced in the manufacture of the material itself, or by means of dye colours, &c., renders it very ornamental at a small cost. Papier Maché being an almost perfect nonconductor of heat, this material is well suited for the construction of houses and roofing in warm climates.

153. Patent Siliceous Stone; Frederick Ransome, Cannon-row, Westminster.

Specimens of the application of the material for the embellishment of buildings. The process of manufacture is as follows:—Flints, with caustic soda, are wrought into a fluid state by the action of heat in close steam boilers, forming silicate of soda or soluble glass, which is mixed with about 92 per cent. of sand. This plastic composition is then pressed into moulds, dried and subjected to the action of heat in a kiln, causing the silicate to form a glass cement, connecting the particles of sand together, and forming an imperishable material in texture and colour similar to the finest building stones.

154. Patent Improvements in the process of Preserving Stone; Frederick Ransome, Cannon-row, Westminster.

Specimens prepared as follows, viz.:—The stone is first coated with a solution of silicate of soda, and then with a solution of the chloride of calcium; the result is, the formation of an insoluble silicate of lime in the pores of the stone, filling in every vacuity and thereby preventing decay from the action of the weather in and on the substance.

155. Patent Pellucid Chromatic Embossed Glass: Henry Page, 195, Whitechapel-road.

156. Imitation of Stained Glass; Henry Myers, M.D., 60, Upper Charlotte-street, Fitzroy-square.

This invention consists in the use of sheets of gelatine, upon which the designs are painted in mineral pigments. The sheets are then placed between two sheets of glass, and fixed in the usual manner.

157. Enamelled Wrought and Cast Iron: the Patent Glass Enamel Co., Birmingham.

The nature and uses of this invention will be best seen from an inspection of, 1st, A, an ordinary tinned iron saucepan, after three months' use; and 2ndly of B, an enamelled saucepan, which has been in use for the same period. In the first the tinning has disappeared, the greater portion having probably been taken up by the food in the form of oxide; while in the second the enamel is still perfect, ensuring cleanliness. (See the *Lancet*.) The other articles shew a few applications of the process to sanitary purposes, as a substitute for leaden tubes for waterworks, breweries, distilleries, &c., as also for ships, culinary or domestic use.

158. Patent Process for Coating Iron with Copper and Brass. William Tytherleigh, Birmingham.

The principle of the process is analogous to that of soldering, the difference being that the

granulated metal is spread over the surface of the iron, instead of being merely applied to the edges which the workman desires to unite. Supposing that it is intended to coat a sheet of iron with brass, the patentee prepares the iron by "pickling," or cleansing it. He then spreads evenly over the surface the common brass solder, and over this he spreads a quantity of borax to act as a flux. The sheet so prepared is placed in a furnace heated to the proper degree, and after remaining in the fire for about ten seconds, is withdrawn and permitted to cool, this short space of time being sufficient to insure the union of the metals. Iron thus coated has been subjected to the severest tests in annealing, rolling, and planishing, and has successfully endured them all, the brass being so firmly united to the iron that nothing short of actually filing it down is able to effect a separation. By using a furnace with doors on opposite sides, and by the adoption of proper machinery, sheets of any size may be thus coated, and the process may be successfully performed on both sides of the sheet at the same time. For coating iron nails with brass and copper, the process employed is as follows:—The metal is fused in a crucible or other proper vessel, and the flux being added, the articles to be coated are placed in the vessel. This method affords results equally successful with those following the process of coating sheets or flat surfaces. The coating is not only firmly amalgamated with the iron, but is bright and smooth; indeed, it is only by the weight and strength that the coated iron can be distinguished from brass or copper. The advantages of such an invention are obvious. The innumerable articles now made of brass or copper may in future, should this invention be extensively adopted, be made of iron covered with either of those metals. Strength, lightness, and cheapness are amongst the principal advantages derivable from the use of the new material; and, in addition, the danger arising from oxidation in the case of iron may be entirely obviated. It is probable that the invention may be susceptible of application to the purposes of boiler and ship-plates, sheathing the bottoms of ships, and many other uses.

159. Patent Steel Tubes. J. G. Russell, Wednesbury.

159A. Specimens of Electro-Deposition; W. H. Wallenn, 68, Chancery-lane.

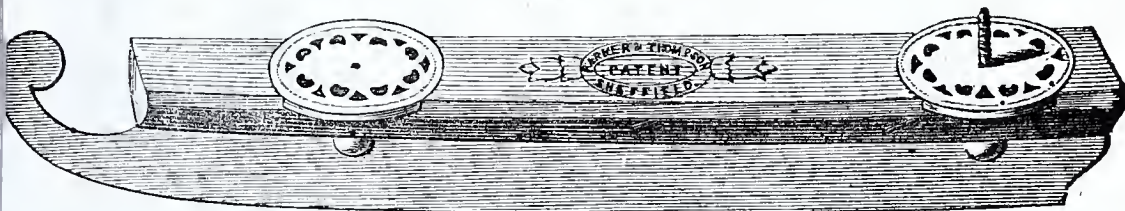
160. Patent Gutta Percha Prize Skates; Parker and Thompson, 20 and 22, Rockingham-street, Sheffield.

The principal advantages of these skates are, lightness, cheapness, improved shape, great strength, and durability, combined with novelty and richness of appearance. Lightness is obtained by the use of less material than is required when they made of wood. Cheapness and improved shape are produced with a saving of labour consequent on the material being of such a nature as to admit of its being instantly moulded into what otherwise would be a most expensive pattern, and adapted to the foot, so as to promote the greatest ease and comfort.

Patent Skates made by Machinery. F. Thompson. Exhibited by Parker and Thompson, Sheffield.

This invention consists of a support for the foot obtained by using a narrow piece of wood, of uniform width, in which is inserted large circular or oval shaped plates, to support the heel and ball of the foot, these plates at the

same time answering the purpose of nuts working upon screws inserted into the irons and passing through the wood, thereby securely fastening the whole together. The process is so simple and expeditious that with only two machines 800 pairs of skates per day can be produced, at a cost considerably less than half the ordinary price.—(See *Mechanics' Magazine*, October 4th, 1856.)



Patent Universal Lock; M. L. Parnell, 283, Strand.

This lock is so formed, that pressure obtained against the bolt, with any other instrument but its proper key, entirely stops the action of the levers. The lock has two actions, namely, forward and backward, in locking and unlocking. This is done by one revolution of the key, as you would lock and unlock any ordinary lock. The levers have to be adjusted twice before the lock can be unlocked, and this must be done before pressure can be applied. The stump of the bolt is peculiar, its horizontal part having a perpendicular end which hooks into perpendicular notches in the levers, after entering their special locking chamber, thus preventing the bolt from going forward in any attempt to unlock it by any other instrument than the proper key. The adjustment of the levers, in the first place, to get the bolt forward, and out of the special chamber into the ordinary locking chamber, is a critical point in the action, and must be effected without the slightest pressure, otherwise the action of the lock is completely stopped. After the bolt is shot out by the key, and held there by the levers, in the further revolution of the key, the bolt recedes and locks down the levers, as also does the shield supported upon a high ward upon which it revolves in the cap-plate of the lock, entirely closing the key-hole during the operation of locking and unlocking. This shield, being connected by means of a stump or notch, with the levers, must be turned, thus entirely frustrating the *modus operandi* of the scientific lockpicker.

Patent Ball Castor. Bird and Scott, Manchester.

The novelty consists in the weight of the table, or other article to which the castors are attached, resting upon the peripheries of two spheres revolving together instead of upon one as heretofore.

Patent Pneumatic Bell: William P. Madison, Barnsley, Yorkshire.

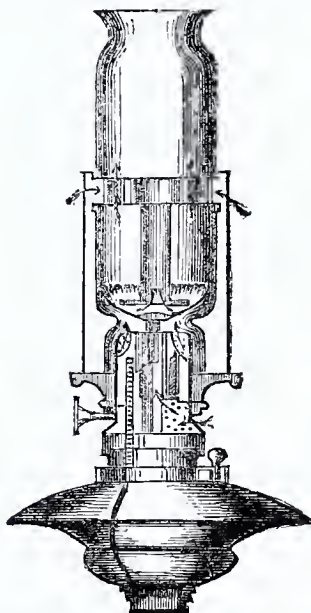
This invention consists in transmitting signals from one place to another by exerting mechanical pressure upon atmospheric air in a tube, one end of which is fitted with a small cylinder and piston which are not air-tight, to the top of the rod of which is fixed a small weight or hammer, and above it is placed a bell. To the opposite end of the tube (which may be of any material), is attached an elastic India-rubber ball, the

quick compression of which causes the piston and hammer to rise quickly, and strike the bell placed above it, any number of strokes being given as may be required. The novelty consists in the fact of the cylinder and piston not being air-tight, which allows the air in the tube to be at all times of the same density as the surrounding atmosphere, and consequently avoids the possibility of derangement from atmospheric changes. One tube suffices as a communication both ways, by attaching a ball and bell at each end, or one bell will suffice for any number of balls, all communicating with the main tube. A slight variation in the construction imparts motion to an index-hand, the point of which may be used to convey signals which can be easily read off, and by which messages may be conveyed, as by the electric telegraph. It is adapted for coal mines, offices, warehouses, manufactories, ships, and for domestic purposes.

165. Specimens of New Products obtained from Paraffine. Price's Patent Candle Company, Vauxhall.

166. Patent Vesta Lamp. W. Young, 34, Queen Street, Cheapside.

These lamps are constructed to burn rectified



spirits of turpentine. The burner is insulated by means of a non-conductor of wood, so that the heat from the burner does not affect the spirits in the vase. The arrangement of this lamp is such as to cause a downward current of air on to the flame which supplies it with oxygen.

167. The Poor Man's Candle. W. Little, 198, Strand.

This lamp is intended for burning bituminous or paraffine oils. A large solid wick is employed, combustion taking place only on its surface; this prevents the diffusion of unconsumed carbon and the charring of the wick—it being stated that one wick will last twelve months. A perfect supply of air is obtained by means of a perforated diaphragm placed over the wick.

*168. Gas Meter; W. Crosley and G. Goldsmith Exhibited by Messrs. W. and J. H. Johnson, 47, Lincoln's-inn-fields and Glasgow.

This meter is of the wet kind, as is shown in detailed views in the drawings. It embraces six different heads of improvement:—the maintenance of a correct water level; a new mode of conveying the water into the meter; the adjustment of the overflow pipes; a mode of venting the waste water chamber; the application of a siphon to the overflow pipe, for drawing off the water after the level has fallen below the lip of such pipe; and the stoppage of the flow of gas through the siphon pipe, when the water line is raised above the legitimate level. (See the *Practical Mechanics' Journal*, Vol. I., 2nd series, p. 227. December, 1856.)

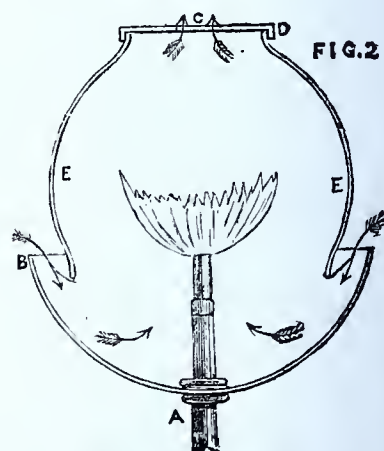
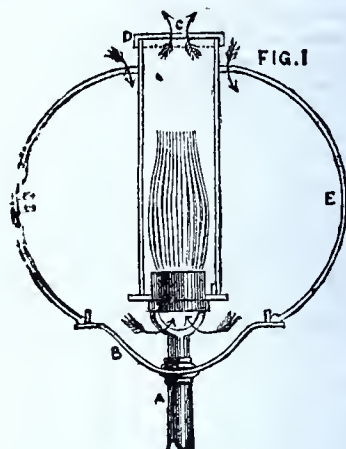
169. Gas Regulator. Charles Esplin, 21, Windmill-street, Lambeth.

In this apparatus the valve for regulating the passage of the gas between the inlet and the outlet compartments is carried by a cover with turned down edges, which enter a trough containing mercury, and this cover moves on axes at one end, such axes being below the fluid. In order to compensate for the varying quantity of the edges of the cover which is from time to time immersed in the fluid, a tube, containing quicksilver, is fixed on the moveable cover of the apparatus in such manner that the fluid in the tube is for the most part at the end of the tube most distant from the axis of motion of the cover when the valve is required to be most open, and so that the fluid in the tube may flow more and more towards the axis of motion as the valve is more and more closed by the lifting of the cover by the pressure of the gas in the apparatus.

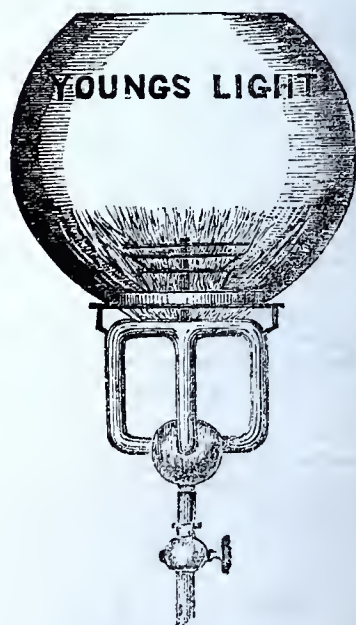
170. Patent Apparatus for the more perfect combustion of gases; D. White, 3, Winchester-place, Pentonville-hill.

Fig. 1 represents an Argand Burner, showing the Patented Improvements. A is the gas supply pipe, carrying a glass cup, B; C represents an opening in cap D; the combustion being supported by a supply of air through the aperture between the outside of the chimney and the top of the globe E. Fig. 2 represents a Fish-tail burner, showing the patented improvement. A is the gas supply pipe carrying a cup, B; C represents an opening in the cap D, which fits

on to the globe E. A support fitted to the supply pipe keeps the globe at a distance from the cup, B, for the admission of air.



171. Patent Gas Burner; W. Young, 34, Queen street, Cheapside.



*172. Safety Sliding Gas Chandelier; Jo Marquis, 18, Porter-street, Soho.

This invention combines the advantages elevating or lowering at pleasure, with secur

from explosion of gas, and from the danger attending the fall of the balance weights, necessarily attached to all other sliding gas chandeliers. The joints in the safety chandelier are all metallic and gas-tight. One balance weight only is used, as shown in the drawing, instead of the usual plan of suspending one over each of the pulleys which, in case of a chain or cord breaking, may produce a serious accident. In this chandelier, should one or all of the chains break, the balance weight would simply fall upon the body of the chandelier—which in itself cannot fall—being secured by the metallic joints. By dispensing with the objectionable centre rod, a wider field is obtained for the development of artistic taste.

3. Ventilating Gas Stove. Archibald Davidson, 18, Porter-street, Soho.

This stove has two openings in the bottom; to one is attached a pipe coming from the outside of the building, for the admission of fresh air to consume the gas; this pipe is turned and carried about two feet downwards, on the outside of the building; to the other is attached a pipe carried to the outside of the building for carrying off the products of combustion; this pipe is turned and carried six or eight feet upwards; the stove thus warms the room without smell. For the convenience of lighting, the top part of the stove may be separated from the under part; the joint is rendered air-tight by a reservoir of water, as shown in the section.

Patent Union Gas Stove. George Neall, Birmingham.

This invention consists in placing the burners below an oval dome of glass, and so combining light and heat.

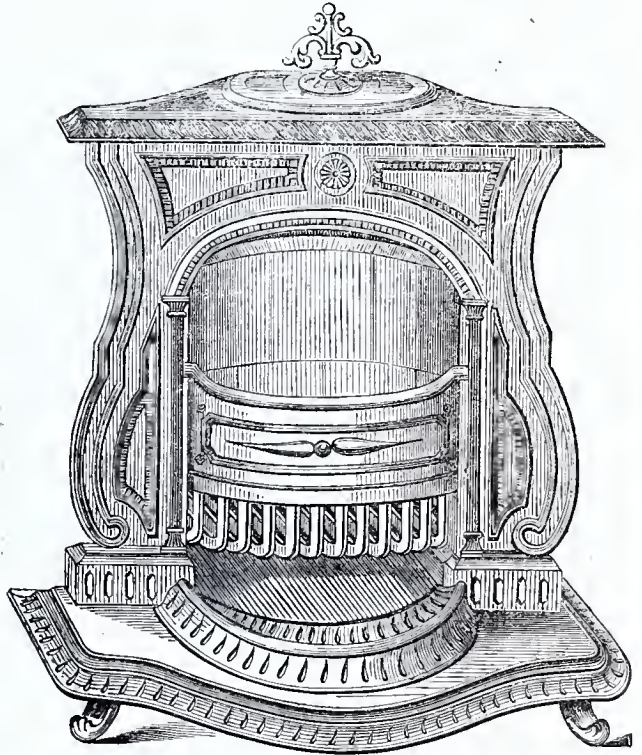
Water Gas-Stove; Charles Brooke, M.A., F.R.S., Surgeon to the Westminster Hospital.

This consists of a hollow cylindrical copper water-chamber, placed vertically, through which pass several copper tubes, connecting an air-chamber below with another above. A ring of small fish-tail burners is placed in the lower air-chamber, and the air heated and products generated by combustion of the gas, passing through the tubes, heat the water, and passing through the upper air-chamber, escape by the outlets into the chimney. The air-chamber is closed below by an annular plate resting on knobs, on which the whole is supported, the sides being perforated for the supply of air to the burners. The absorption of the generated heat by the water, and its transmission to the air of the apartment is so complete, that the temperature of the air and gases escaping is not greater than that of the water in the upper part of the cylinder. The advantages of this arrangement are, that the full amount of heat generated by the combustion of the gas is rendered available, and from the necessarily low temperature of the air emerging, the precautions necessary for an ordinary flue are found to be unnecessary.

The Franklin Stove: F. A. S. Witter, George-street, Manchester.

This stove has the grate elevated so far that a sheet of zinc is a sufficient protection for the floor where a hearthstone is not convenient. By the application of a blower or upper front cover,

the fire may be lighted quickly, and when removed it will burn freely; on the application of a damper or lower front cover, it will burn slowly. If both are applied the fire will be enclosed safely for a night. The hearth of the stove is provided with an ash-pan, and a grate to cover it; also with a fender.



The grate for coal is on axles, and invertible. There is a place at the top where water may be evaporated to prevent dryness of the atmosphere in small rooms.

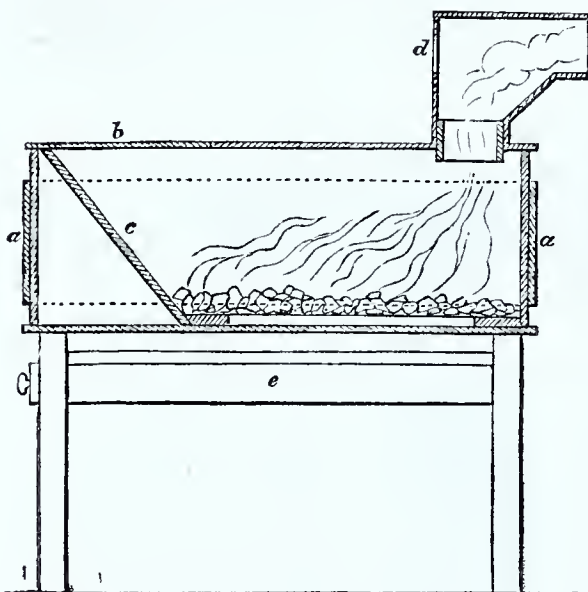
177. Patent Deflector Stove; John Lee Stevens; Exhibited by Messrs. Hayward Brothers, Blackfriars-road.

The stove exhibited corresponds with one fixed by Hayward Brothers, in the surveyor's room, at the Board of Health. When in action currents of air pass in underneath the grate, and, entering behind it, are at the same time heated in their course, and so projected against the back and upper part of the fire as to ignite and convert into flame the gases passing off from the coal, instead of allowing them to escape in the condition of smoke. In these open stoves the fuel absorbs the heated air more rapidly than the cold. As there are no moveable parts in the Patent Deflector Stove, its cost little exceeds that of an ordinary grate. The chief advantages derivable from the use of the invention are:—Great increase of flame at the back and top of the fire, and corresponding subversion of smoke—a much more cheerful and brilliant fire with the same expenditure of fuel—very great additional heat—the means of consuming coal-dust with or in lieu of large coal—great improvement in the draught—and avoidance of dust.

178. Improved Stove for Drying Rooms, Horticultural Purposes, Piano-forte Makers, &c.; Thomas Dixon, 4, St. James's-place, Hampstead-road.

The body of this stove is of cast-iron, surrounded

with a wrought-iron band for preventing accident, in case of the body of the stove cracking. The other peculiarities are the mode of supplying the fuel, and the arrangements for cleaning the flues.



- (a) Wrought iron band.
 (b) Cover to be placed on top of stove while putting in fuel.
 (c) Slanting piece to keep fuel away from front.
 (d) Door to admit jointed rod to be attached to swivel scraper, to draw soot from horizontal part of flue, where there is a door for placing the scraper behind the soot.
 (e) Ash pan in some cases necessary.

179. Improved Bakers' Oven. John Trueman, 34, Castle-street, Belfast.

This oven consists of a chamber of wrought or cast iron, surrounded by brickwork, a space being left between the brickwork and the top and sides of the oven for the free circulation of the heated air, which passes off by a flue in the centre above the oven. The bottom is laid with sheets of iron, carrying a layer of sand and tiles, and may be constructed with a tray to draw out the batch bodily, or on the stationary principle, with an ordinary oven door and fittings. It is heated by a small stove placed below the bottom, which may be fitted with a deflector for diffusing the heat more evenly over the entire inside surface of the oven. The supply of atmospheric air to the furnace is obtained from a number of passages which open at their converging ends into an air chamber immediately below the grate, whilst their outer ends may be conducted outside the oven. A valve at the side or top of the oven allows of the exit of steam and vapour, which then escapes by the flue.

180. Hicks's Patent Hot Ventilating Pipe-Stove. Exhibited by W. Rowe, Sherborne.

This invention is suitable for warming churches, chapels, schools, halls, shops, factories, green-houses, coachhouses, &c., and is so constructed that it forms a hot chamber the whole length of the body of the stove and elbow. The fire pail is suspended in such a manner in the centre of the outer case, that the fresh air, coming in through a hole, 3 in. in diameter in the base of the stove, passes up between the fire pail and outer case, discharging itself in a volume of pure fresh hot air from the elbow pipe at the top of the stove, which can be used to convey fresh hot air from one room to another. In close

rooms, where there is bad ventilation, a pipe must be attached, which does not affect its probability; it may communicate with the chimney or pass through a window.

181. Stainton and Davey's Patent Fuel Stove. Exhibited by Deane and Dray, 1, Arthur street, London-bridge.

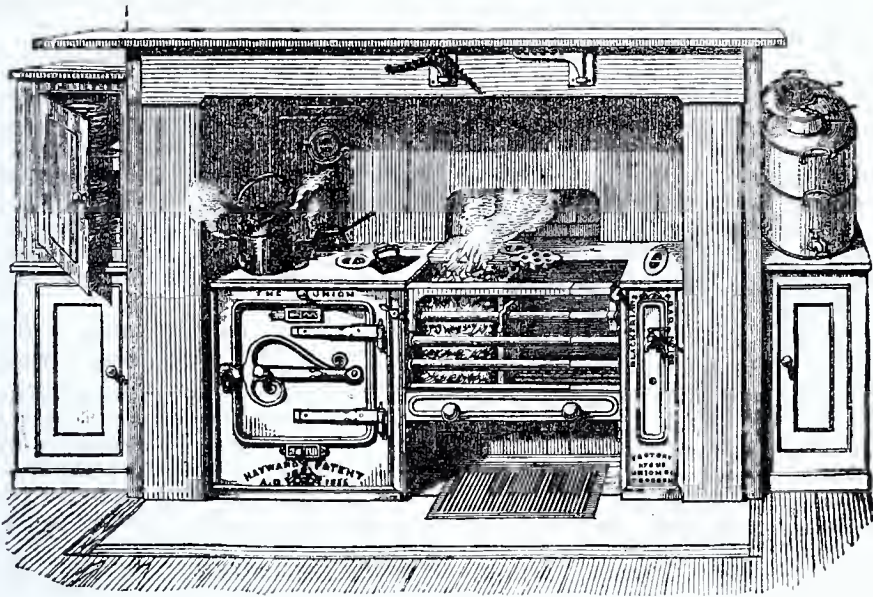
This stove is applicable to the economical combustion of coal, coke, or other material, including inflammable gas. In the construction or arrangement of the stove to be used for the combustion of coke, coal, and such like fuel, great heat is obtained in the grate, basket, fire-pan underneath a fuel or feed chamber (and in the stove for gas in the combustion chamber), whence the heat ascends through one or more shafts or flues to the top or hot-chamber, from which the heat descends and circulates within the body of the stove around the fuel chamber (in the gas stove around the air shaft), whence the products of combustion pass off into the chimney or exit flue without sensible loss of heat, whereby the combustion the heat resulting from the combustion is greatly economised. Gas can be used in the stove without the modifications alluded to. Except in the stove as preferred to be used for the combustion of gas, the fuel chamber is immediately above the grate, fire pan, basket, which can be charged with a sufficient amount of fuel to last a given time, according to the capacity of the stove, so that when fuel has once been well lighted, no further attention will then be required.

182. The Union Kitchen Range with Open Fire; Hayward, Brothers, 117, Union street, Borough.

The advantages of this open fire range are, that in it the heat can be directed to the top of the oven, or equally to the top and bottom at the same time; and in either case, the whole of the hob above the oven presents a boiling surface, hot plate, of sufficient power to heat steam apparatus, saucepans, kettles, stewpans, for boiling or preserving. The hob may also be used as an ironing stove. The oven will heat without any setting whatever. It may be used on either side of the fire, and can be heated "slow" if required, but the temperature may be raised at pleasure, and kept at any point for baking bread, or up to a "quick" scorching heat for roasting meat, which, if occasionally basted, cannot be distinguished from that which has been placed before the fire. The usual size of the oven is about sixteen inches square, but much larger are made if required. The boiler is, in appearance, like that of an ordinary range, but its peculiar shape gives it power for steaming or for heating large quantities of water for baths, hot water pipes, &c. The oven is encased, leaving a flue or space round, into which, (through a recess in the oven cheek) the heat from the lower part of the fire is admitted, instead of being lost, by passing upwards to the chimney in the ordinary manner. The direction of the heat is governed by a handle which is attached to a flap working in the space between the oven and the boiler. The amount of heat is regulated by a damper, which should be drawn out to three inches when the hot plate or the oven is required; and if the heat should then be

too great, the draft must be diminished by pushing the damper farther in again, and the intensity of the heat will thus proportionably diminish. A very small fire is sufficient to heat the oven, hot-plate, and boiler; but the fuel should always be high enough to cover the top of the opening in the oven cheek, and kept well into the recess, so that the fire shall not burn

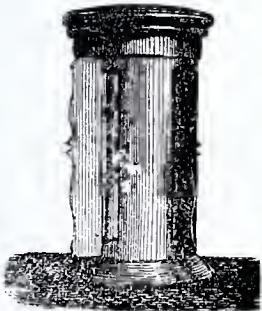
hollow in this part, otherwise cold air will be admitted into the flues and check the oven. A large fire is only required for roasting in front of it. Should the flue above the hot-plate require clearing, it is done by passing the flue-brush upwards and downwards through the circular door, but this is seldom required, excepting when the chimney is swept.



Pneumatic Moderator for Chimneys; W. G. Wilson, 13, Princess-street, Little Queen-street.

This apparatus consists of a series of weighted and balanced valves; each valve being less than the diameter of the inside of the chimney. They are placed alternately on the right and left sides, and in case of a downward current of air the pressure of the air overcomes the balance weights, thus partially closing the flue. The valves are free to move either up or down, so as to admit of the ordinary machine being used for sweeping the chimney.

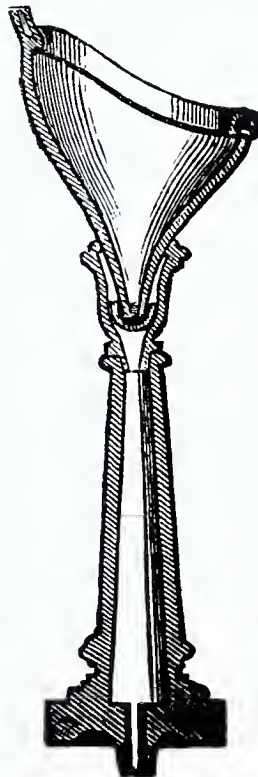
Patent Æolopyle; W. H. Woodford, High-street, Taunton.



In this contrivance the sides have as many sets of triple vanes as the angles exposed to the wind require, and entirely shut out the wind while the free outlet of the smoke is obtained by an effectual guard, so that the wind changing as often as it may, the outlet of the smoke is safely protected by the outside vane, and a thorough ventilation to all flues, whether in

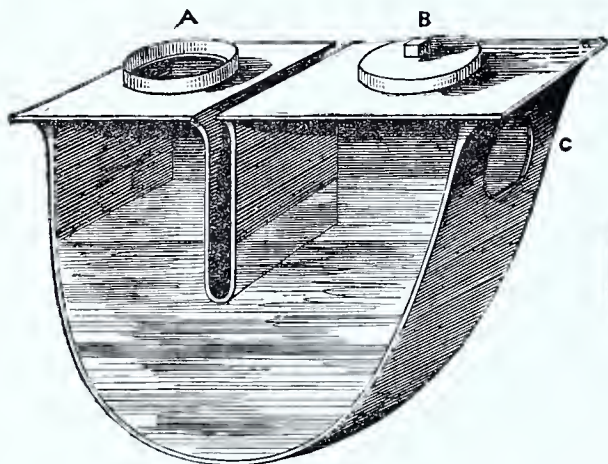
use or not, is secured, by allowing the vitiated air to escape, and a free current of fresh air to be continually kept up.

185. The Pedestal Urinal, registered; Wilcox and Co., Millwall.



This urinal is constructed with a trap to shut off communication with the drain, the trap forming a water-joint. Along the upper margin of the basin runs a chamber to distribute water over the internal surface; the supply of this may be continuous or occasional. The water passing through a grating at the bottom of the basin, runs into the trap, and the surplus escapes down the pedestal. This arrangement is said to render it peculiarly fitted for office use.

186. Improved Lead Trap. D. G. Laing, 2, Villier's-street, Strand.



This trap is applicable to water closets, sinks, or rain water pipes. The sharp-edged dip pipe, so objectionable in the ordinary traps, is avoided, and a full way provided for the discharge of all that has to pass through the trap. By the addition of a brass manhole on the top of the right hand or outlet shoulder of the trap, it can at all times be cleansed with facility. A, Soilpipe or opening for W. C. apparatus.

B, Brass manhole for cleansing trap. C, livery into soil pipe or drain.

187. Sanitary Ash Closet; Thomas Hudson, South Shields.

This invention consists of a closet placed the ordinary ash-pit or dust-hole, the thing being, that the ashes when deposited, neutralise or absorb the noxious gases.

- * 188. Ventilating and Flushing Closet. Archibald Davidson, 18, Porter-street, Soho.

This closet has a pipe attached to the high part of the drain pipe and carried to the top of the building, or into the rain water pipe carrying off the gases which may be generated in the drain, or escape from the sewer, a pipe carried from the syphon to the cistern washing it out as often as may be required.

189. Method of Ventilation. Archibald Davidson, 18, Porter-street, Soho.

This consists of an opening from the outside of the building to the fireplace, where the air may be warmed in a chamber constructed at the back and sides of the fireplace as well as on the hearth, before it enters the room. There is in addition to the ordinary chimney flue a chamber constructed by the side of it to carry off vitiated air of the room. The ventilating may commence either near the fireplace or any other convenient part of the room.

- 189A. Refuse Grease Lamp; William Dill, Floore, Northamptonshire.

- 189B. Self-Acting Window Blind Rack Pulley. This arrangement is designed for keeping endless cord at a uniform tension.

MISCELLANEA.

Improvements in Bookbinding: A. A. Gaget. Exhibited by P. De Fontaine-moreau, South-street, Finsbury.

This invention consists in the employment of hooks for binding or holding together, at top and bottom, loose leaves or pamphlets. At the top and bottom of the cover, a connecting piece in an inclined position, is placed over all the hooks for obtaining a firmer hold. The back is composed, by preference, of wood in one or several pieces, united according as it is fixed or progressive, and is furnished with slides or notches to receive the pressure hooks and connecting pieces.

Patent improved Gutta Percha: P. A. Godefroy, 3, King's Mead Cottages, New North-road.

Many attempts have already been made to obtain a substitute for, or some material to combine with, gutta-percha, and the desired object is now said to be secured in this article, the patentee having discovered and availed himself of an economical and entirely new adjunct, namely, the prepared shell of cocoa-nut, which is both highly indestructible and a non-conductor. These vegetable products, the cocoa-nut and the gutta-percha, being of the same botanical family, the chemical affinities are nearly identical; hence sufficient carbon is eliminated for the chemical combination of the two matters when in contact, to produce a substance superior, in essential qualities, to gutta-percha alone, applicable at once to all its present uses, and possessing properties that must largely promote the consumption of the combined article. The economy of the adjunct is evidenced by the fact that it will not exceed £20 per ton prepared for the gutta-percha, and from 25 to 40 per cent. of the adjunct may be combined, according to the description of manufacture. But, besides economy, the improvement includes its capability of use in all climates, durability, resistance to extreme friction, elasticity, and universal adaptation. Gutta-percha alone, gives and spreads in warm temperatures, and in cold climates becomes very brittle, and cracks; but by the use of the adjunct, the effects of high or low temperatures, and severe friction, are equally obviated, and this combination of materials may be applied to purposes for which gutta-percha alone cannot possibly be available. It is adapted for lining ships and boats, as well as for numerous utensils for both arms of her Majesty's service. It is also suited for electric wires, mill-bands, over-shoes, shoe soles, tubing, covering damp walls and floors, for vases, baths, troughs and pails, for mouldings, modellings, toys, ornaments, ornamental designs, and many other purposes.

Patent Flat Pressure Process of Stereotyping; James Hogg, 18, St. Andrew-square, Edinburgh.

The process is as follows:—A stiff paste, chiefly

composed of cheap earthy substances in a state of impalpable powder, is made up and spread evenly upon a stiff wrapper. This paste is laid upon the "form" of types, and an impression taken similarly to the pulling of a proof sheet. This gives the matrix, which, when properly dried, is cast from by pouring the fluid alloy of type metal into an ordinary casting box, consisting of two iron plates held vertically, and having between them the matrix with a gauge for the required thickness of plate. The "flat pressure process" of stereotyping is quite as cheap as the old methods, while it presents the following important advantages:—1. There is no appreciable "wear and tear" to the type. They are neither ground nor rounded in the face; they are not dirtied; they are not returned to the compositor in a caked condition, which makes it impossible to "distribute" the "form." 2. The matrix gives a level surface, almost free from shrink or twist, hence the plate is easy to "make up" at press. 3. The matrix having an earthy base, the alloy can be poured at a proper heat (in order to obtain a homogeneous plate) without fear of charring. This the paper system will not allow. 4. The plates are perfectly free from those globules of metal which in the gypsum system fill up the "daylight" of letters. 5. There is no filling up of spaces or blanks, as required in the gypsum system. Hence the whole annoyance and expense of keeping high spaces and leads for stereotype and low ones for ordinary work, is at once swept away. It is of no consequence in this process whether high or low spaces and leads are used. 6. The matrix, if kept dry, will keep for any length of time. This permits the matrices of a volume to be taken without proceeding to the expense of casting until it be known whether the plates are actually required. 7. Woodcuts, whether separate or mixed up with letterpress, can be taken with remarkable sharpness, and without the slightest injury to the blocks. By the paper system woodcuts cannot be taken. By the gypsum system the blocks must first be coated with a varnish, which tends to fill up the fine lines.

193. Metallic Flesh Brush; J. Walton and Sons, Haughton Dale Works, Denton, near Manchester.

This invention consists of the application of very fine wire for flesh brushes, and other domestic brushes, to supply the place of bristles, &c. The wire is set in an elastic cloth ribbon or band, and pillowed on a soft and yielding cushion, and the metallic dents or teeth pass, therefore, pleasantly over the surface of the skin, never tearing or abrading it.

194. Patent Ventilating Surgical Gusset; W. G. Merritt, 49, Leadenhall-street.

This invention is applicable to articles of clothing of every description, and is intended for the ventilation of various parts of the human frame.

195. Patent Boots; Stephen Harris, New Peter-street, Westminster.

These boots are made with side gussets, which fold into the boot, thus keeping out wet and dust, and allowing for the swelling of the foot.

- * 196. Patent Button Fastener. Griffin and Duley, Northampton.

This invention consists in fastening buttons, studs, &c., by means of a screw and nut, the screw being fixed to the ordinary shank button. An improvement has also been made in the manufacture of the Florentine button, which consists in placing a piece of any flexible material between the two shells in the course of manufacture, thereby forming a loop or flexible shank to which the screw and nut can be attached.

197. The Chef d'Œuvre Kid Glove Stretcher; R. L. Packer, 38, Union-street, Lambeth-walk.

This invention consists of certain improvements in the mechanism of kid glove stretchers, viz.— 1. An improved double-action spring. 2. The partial concealment of the spring. 3. A metallic double-action fulcrum. 4. The fulcrum screw pins.

198. Self-Attaching Brooch; W. H. Forster, Gravesend.

The advantages of this invention are, that the brooch can be fixed to the dress more expeditiously and more securely than with the pin and catch at present in use.

199. Straw Bottle Envelopes; Barsham's Patent. Exhibited by W. Seymer and Co., 37, Eastcheap.

By the use of these envelopes great rapidity is attained in packing wines, spirits, beer, &c., for export, and as fifteen dozen of quart bottles in the envelopes will pack in the usual space of twelve dozen, an important saving in freight is effected. Each bottle being surrounded with an equal quantity of straw, perfect security is also insured. In hot climates these envelopes can be used as refrigerators, by simply dipping the bottle with its cover into water and then exposing it to the air.

200. Improvements in Bee Hives; Robert Downie, Barnet.

The improvement consists of a moveable open floor, the bars being placed transversely to the bars of the hive, to prevent the bees continuing their comb, in order to keep the space clear under the transverse bars, for free ventilation into the hive; there is also a loose bottom introduced, for removing dead bees or any extraneous matter which the bees might make, without admitting cold air, as the ordinary method of lifting the hive for the purpose of removing the dead bees. There is also a contrivance for a doorway into the hive, which can be enlarged or contracted at pleasure. At the back part of the bottom is a piece of perforated zinc, similar to the entrance in front; the top of the hive is also ventilated with a piece of perforated zinc.

201. Patent Horse Collar; Musselwhite Sons, Devizes.

This collar is composed of cork, horse-hair strengthened by an iron rim and rib, made to open to pass over the head of the horse. The chief merits are, that it does not gash the horse's neck, and is much more durable than ordinary collar.

202. Patent Crampon; Joseph Anelli, Westbourne-place, Paddington.

This is a contrivance for attaching small to the hoofs of horses to prevent them slipping in frosty weather, and may be removed or fastened on or taken off without removing the shoes.

203. Patent Imperishable Ground Indicators; Benjamin Looker, jun., Kingston-on-Thames.

These ground indicators have been introduced for the purpose of marking grave-space sections in the different cemeteries formed under the new Burial Acts. The annexed woodcut represents one form of these indicators. They are made hollow, in well-burnt red pottery, terra cotta, and stone ware, with a solid bevelled top, on which are impressed, and coloured with a permanent vitrified black, any letters, figures, or devices that may be required. They are manufactured by patent machinery, under steam pressure, any desired form or size, and are applicable for every purpose for which a mark in the ground is necessary. The top of the indicator may be required, have two or more labelled sloping in different directions, or may be flat. The perforations in the lower part are intended to give the indicators a firmer hold in the ground.



204. Patent Imperishable Garden Labels; Benjamin Looker, jun., Kingston-on-Thames.

These garden-labels are made on the same principle as the preceding, and composed of the same materials. On the face of the label, when the clay or earthenware is in a plastic state, are impressed any names of plants, &c., that may be required.



205. Imperishable Indicator Tiles; Benjamin Looker, jun., Kingston-on-Thames.

These tiles are intended to be used where a mark or indication is required in a wall or on a building. The tiles may be of any shape, and in any description of earthenware. The specimens exhibited are 9 inches square, being the length of one and the width of two bricks, for the facility of fixing in wall. They are impressed with initials, as a suggestion for marking the new parishes or districts. The letters are coloured with permanent vitrified black.

Patent Self-Acting Apparatus for obtaining extracts from various substances, and for refining fluids ; G. B. Watkins, Godmanchester.

This invention consists of three cylinders, two of which are united by a hollow, inverted, truncated cone, forming an incline from the upper to the lower cylinder, which rests on a hemispherical base supported by three feet, and in the front of which cylinder at the bottom a tap is inserted. The third cylinder has a projecting ring at the bottom for receiving and securing the strainer-cloth, and it fits loosely in the upper cylinder finding its bearing a little way down the cone. This cylinder has a bowed-handle to remove it when necessary, and receives the fluids and substances to be acted on. When the fluid is poured into the strainer, the air from the lower cylinder escapes between the two upper cylinders, and when the lower chamber is full, the fluid rises all round the strainer to a level with that in the strainer, and when the tap is opened the hem of the cloth retarding the recession of the fluid outside the inner cylinder, throws a pressure on that within it, causing it to flow off clear and brilliant. The instrument has a hemispherical lid and side handles.

Patent Antiseptic Compound for the Preservation of Alimentary Substances, &c. G. Warriner, 38, Finsbury-square.

This compound is composed of glycerine, water and salt, or of glycerine with fat, or gelatine, or alcohol, or powdered charcoal, according to the article to be preserved. The preservative qualities of glycerine have long been known, though the difficulty of obtaining it pure has prevented its use, but the new process for making stearine, more particularly that employed by Messrs. Price, of Belmont, has produced it pure and cheap. Glycerine is of itself so sweet and luscious that it spoils the flavour of the article preserved, so that the use of only a small quantity becomes desirable. The best plan is found to be that of placing the article in an air-tight vessel, and withdrawing all the air and injecting the liquid, similarly to kyanizing wood.

Patent Fountain Pen ; Stark and Co., Monkton, Thanet.

This pen contains a reservoir for ink, partially formed of vulcanised india-rubber; its action requiring only a slight pressure of the forefinger on the elastic spring, which produces a uniform flow of ink during the act of writing.

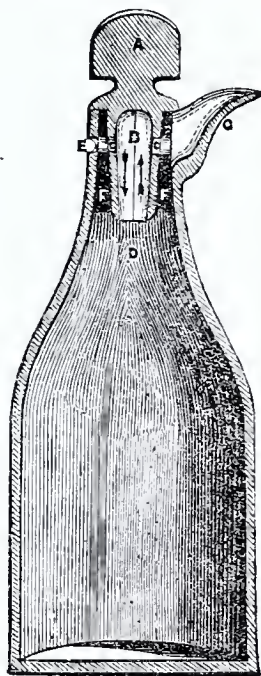
Patent Balance Pens : Blackwood and Co., 26, Long-acre.

These pens are constructed with a shield at a suitable distance from the point, which forms a rest ; and, by resting the point, prevents the pen charged with ink from soiling the fingers or the article it is laid upon.

Patent Syphon Bottles ; R. Pinkney, Patentee. Manufactured by the Proprietors, Messrs. Blackwood and Co., 26, Long Acre.

This bottle obviates the disadvantages of having to draw a cork, especially when the contents are of a nature to soil or stain. It is applied to ink-

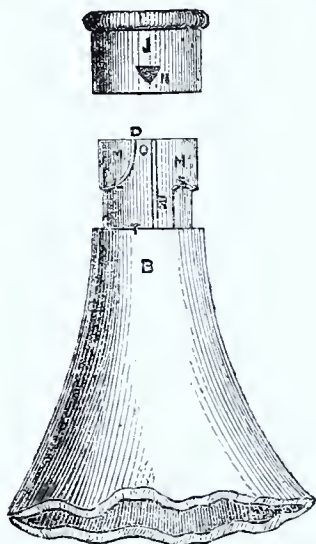
bottles at the same cost as common corks. The drawing shows the bottle in section—the stopper, A, is made of gutta-percha, glass, &c.; it is tubular and in two divisions, fitted accurately into a cork, the latter cemented firmly into the neck of the bottle. In this tube two lateral holes are made, C, C, and corresponding holes are made through the cork, FF. The back of the neck of the bottle has a hole E, the opposite opening being formed by the spout. In using it, it is merely requisite to turn the stopper round to bring the several holes into or out of correspondence, to open or shut off the flow of liquid from the bottle. When the outflow passage is closed, the hole in the stopper is against the blank or solid portion of the cork, and on turning it round all the holes correspond, the air finds its way down the division of the tube (indicated by the downward arrow,) into the bottle, supplies the requisite pressure, and causes a free steady and equal flow of ink up the other division, and out by the spout. It is adapted to many chemical liquids, poisons, &c., where care is required in their use. Small quantities may be used at a time—the flow being quite at command, so that the liquid can be poured out drop by drop if necessary.



211. Patent Capped Bottles : R. Pinkney, Patentee. Manufacturers and Proprietors, Messrs. Blackwood and Co.

This bottle is also intended to obviate the nuisance of drawing a cork, and it is perfectly air and liquid tight. The cap is simply removed by unscrewing, and replaced as easily, and the cost very little more than ordinary corks. In the drawing the projection M, formed round the neck, has a passage, O, one such passage being on each side, opposite the other; L, is the inclined under edge of this projection. The cap is formed of brass, glass, &c., and has two projections inside, N, opposite each other; in the top of this cap is an elastic disc, of cork, india-rubber, or other suitable material. The cap is placed on the neck, the projection N passing down the passage O, and by turning the cap round, the inclined edge, L, causes a progressive

downward motion of the cap, pressing gradually right upon the top of the bottle, D, rendering it



completely air and liquid tight. It will be served that the bottle is just as it comes from the mould, so that a bottle blown in the usual manner, requires simply to be brought to level to be ready for the cap.

212. Screw-Necked Bottles. F. Simpson
City-terrace, City-road.

These bottles have a female screw in the neck into which the ordinary cork may be screwed.

213. Patent Spring Mattress. Wm. Smees
Sons, Finsbury-pavement.

The peculiarity of this mattress consists in the laths on which the bed rests being attached to their extremities to a series of helical springs at the head and foot of the headstead. It is simple in construction, and may be packed in a small compass.

214. Patent Pendent Cot : Cottam and Hargrave
Cornwall-road, Lambeth.

A D D E N D A

TO THE

CATALOGUE OF THE NINTH EXHIBITION OF INVENTIONS.

Locomotive Engine and Tender; T. R. Crampton, C.E., Buckingham-street, Adelphi.

Engines constructed upon this principle were the first to be employed for express trains in France, in 1849. Their peculiarities are the low centre of gravity, the absence of over-hanging weight, and the facility of repair, the whole of the working parts being outside. Upon the railways in the north of France, engines upon this principle have run on an average 26,000 miles per annum; whereas, the ordinary engines have only run 16,000 miles. Statistics taken over seven years, show that the wear and tear is less than in ordinary engines, and the excess of distance run is in a great measure attributed to the facility with which small repairs can be executed without removal to the workshop. Out of 22 locomotives exhibited at the Paris Exhibition, 14 were upon this principle. The only great medal awarded for locomotives in 1851, was given for this invention, and it is stated that a similar award would have been made at Paris in 1855, had not Mr. Crampton been one of the jurors.

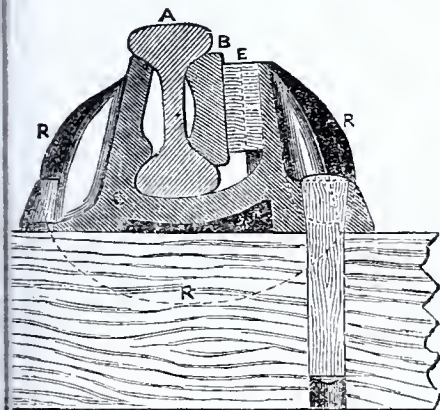
Patent Wedge Fish-Joint Chair and Intermediate Chair with Iron Wedge and End Grain Wooden Cushion; P. M. Parsons, 6, Duke-street, Adelphi.

The chief features in the joint chair are, that it affords the rails vertical and lateral support, while at the same time it effectually fishes the

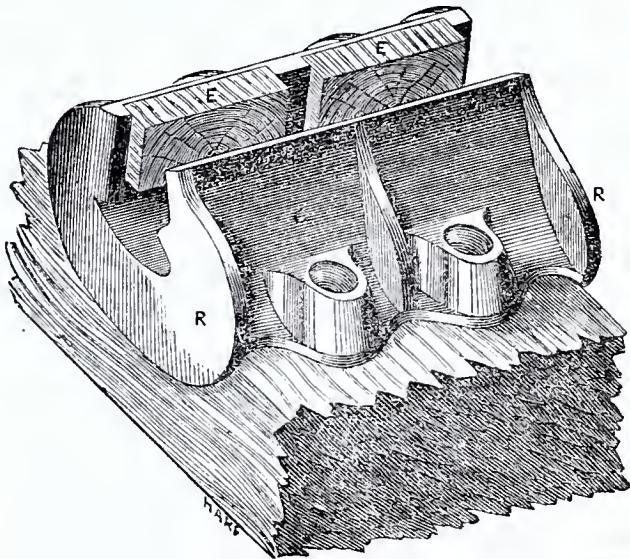
joint, and this without the use of bolts and nuts and the consequent necessity of making holes in the rails. This is accomplished by making the fish on one side a wedge of wrought iron, which is driven in between the rails and cushions of wood placed in the chair with their end grain against it. The fish wedge is provided with jags or barbs, which house themselves in the wood cushions, and as no shrinkage in the thickness of the cushions (from the wood being placed endways of the grain) can take place, the combination affords a secure and durable fastening, and at the same time a perfect fished joint. All the parts are simple and inexpensive, and with the exception of the wooden cushions, are indestructible, and these being creosoted, and protected against the admission of moisture by the chair on one side, and the fish wedge on the other (which cover the end grain and sap vessels), are considerably more durable than ordinary wooden keys. The overhanging ribs or flanges bring the whole of the bottom of the chair into tension, and thus give great power of resistance to the strain thrown on it in driving the iron fish wedge. The intermediate chair is constructed on the same principle as the joint chair. It holds the rail much tighter than with the ordinary chair key, and keeps it firmly down on its seat. It is stated that no instance has yet occurred of a wedge shaking out, although it is upwards of two years since the first were laid down. These chairs are in use on the Great Northern, Eastern Counties, East Kent, and South Western Railways. A prize medal was awarded at the Paris Exhibition of 1855.

THE WEDGE FISH JOINT CHAIR.

Cross Section.



Isoametrical View—the Rails and Wedge removed.

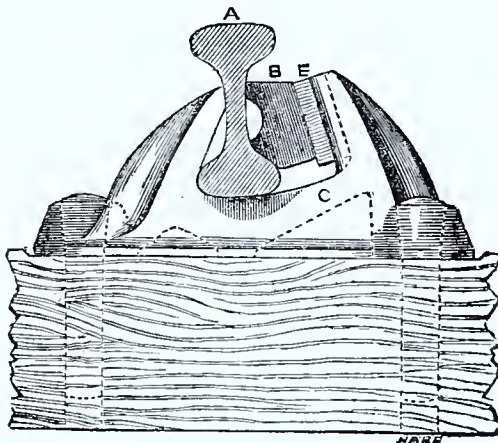


A The Rail. B The Fish Wedge.
C The Chair. E End Grained Wooden Cushions.
R Strengthening Ribs.

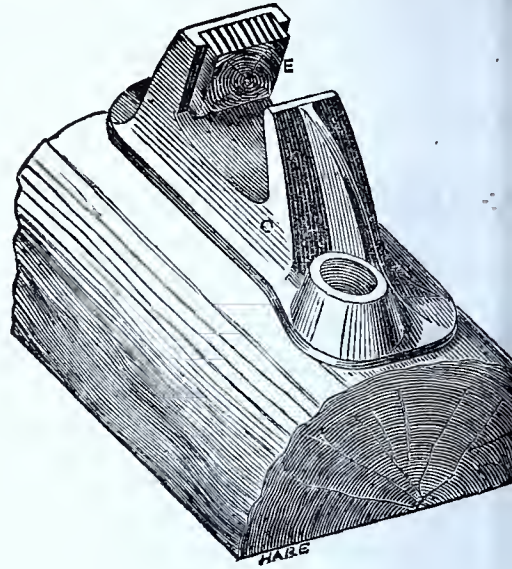
INTERMEDIATE CHAIR.

End View.

Isometrical View—Rail and Wedger mould.

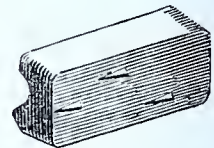
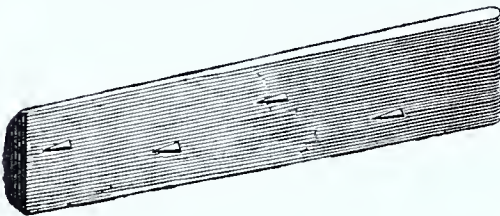


A Rail. B Wedge. C Chair.
E End Grain Wooden Cushions.



The Wedge of Intermediate Chair.

The Fish Wedge, showing the jags or barbs which house themselves into the wooden cushions.



118. The Nautilus Diving Apparatus; Exhibited by the Nautilus Company, 34, Great George-street, Westminster.

This machine consists of a working chamber, capable of accommodating a large or small number of divers, and surrounded by other chambers, in which the relative proportions of air and water may be so regulated, that the divers within the machine are able to sink or raise it, or to endue it with a buoyant power for lifting weights, according to circumstances. Compressed air is supplied to the apparatus through a flexible tube connected with a reservoir at the surface. For detailed description, see *Journal of the Society of Arts*, No. 224, page 244.

119. Apparatus for Improving the Ventilation of Mines, by Removing Noxious Gases from Fast-End Workings; James Wadsworth, Hazel-grove, Stockport, Cheshire.

The great difficulty in the ventilation of mines is the dislodgement of inflammable gas from those remote parts of the workings, through which it is found impracticable to introduce an atmospheric current sufficiently powerful to prevent the accumulation of such gas in dangerous quantities. Two means of effecting this object are here shown. The first consists of a double-acting bellows, mounted upon a carriage, running upon the ordinary tram rails. This carriage also carries a supply of socket-pipes. When the machine is in use the pipes form communications between the inlet-nozzle

of the bellows and the deposit of gas on one hand, and between the discharge-nozzle the nearest level or air-course on the other hand. The bellows being then worked, drive the gas through the inlet-pipe and exhaust through the discharge-pipe into the level, where it mingles, and is carried off with the atmospheric current maintained by the means of general ventilation. The second apparatus causes a continuous current to be maintained through pipes from the highest part of the fast-end workings, where the gas accumulates, to the air-course, by means of rarefaction produced by heat. It consists of an inner furnace-chamber, heated by the flame of a lamp, or partly by the flame of a lamp, and partly by the combustion of a portion of inflammable air. The lamp is contained in the box which forms the bottom of the furnace-chamber, the air to support combustion being admitted through valves guarded by tissues of wire gauze. There is a third pipe for the admission of inflammable gas, if desired. The lamp is furnished with a wire gauze. A second chamber, of larger dimensions, envelops the furnace-chamber, having pipes of communication with the far end of the fast-end workings on the one hand, and with the air-course with the other. The heat radiated from the external surface of the inner or furnace-chamber raises the temperature of the atmosphere in the space between the shells of the two chambers. The consequent exhaustion of the inlet-pipe causes a continuous in-draught of foul air, which passes through the outer chamber, and issues from the discharge-pipe into the air-course.

- 3A. Patent Tin-Plate Cutting Machine, and Patent Paper and Cardboard Cutting Machine; Stephen P. Ruggles, Boston, U.S. Exhibited by A. W. Conner, Duke-street, Adelphi.

The peculiar action of these machines consists in a rotary steel disc attached to gearing and travelling through their whole length above a horizontal steel cutter fixed to the lower framing. This framing supports the table and butt gauge. The box sliding along the upper portion of the machine, carries the steel disc and gearing, and in the handle there is a spring set up by screws at the end, to keep the cutters up to their work. In the smaller machine the drawing action of the circular cutter necessary to cut clean, and which in the larger is produced by gearing, is obtained by a piece of cat-gut passed over the brass disc in the manner of a bow drill. These machines combine the action of ordinary scissors with this advantage, that the cutting angle is always the same, and the drawing action of a knife is caused by making the disc rotate quicker than it traverses along. This is of great utility in the machines for cutting the thicker class of plates, the plates being separated by the cutters entering barely $\frac{1}{8}$ th of an inch, and so cutting with much less power and avoiding curling and burr on the edges cut. When circles are to be cut, a carrier is hung from the traversing box, pressing down the tin or other substance between the two discs by means of a cam-headed lever above, and as the bearing centre travels with the cutter, the same in feeding itself causes the sheet to turn round and cuts a circle without any previous centre-punching or scribing. Ellipses, &c., may also be produced. In the larger machines the top and bottom frames are adjusted to each other by crank or eccentric bolts at the ends so as to be set to cut different thicknesses of plate, whilst the circular cutting apparatus is detached from the traversing box, but travels in the same direction and at the same speed, thereby producing a similar result.

4. Magneto Electric Step by Step Telegraph; Siemens and Halske. Exhibited by C. W. Siemens, John-street, Adelphi.

This instrument possesses the advantages of great simplicity, entire suppression of the battery, and capability of working through a great length of line-wire (having been worked through 3000 miles) without intermediate relays. It is intended chiefly for railway companies, and private telegraphs, requiring only one line and being always ready for work. The instrument called the Indicator consists of two permanent magnets fixed to a frame, with the opposite poles turned towards each other, between which, are placed the moveable poles of an Electro Magnet. Positive and negative currents passing in succession through the coils of the electro magnet, cause a reciprocating motion of these poles, which are therefore successively attracted by the two permanent magnets. By this motion, a needle is turned on a dial step by step, showing the different letters and signs. The electric current is produced through a second apparatus called an Indicator, which consists of several permanent steel magnets, having one common anchor made of a soft iron core, covered

by means of a wheel and pinion through the crank fixed over a dial, showing the letters and signs corresponding with the Indicator described above. By each half-revolution of the anchor, a current is produced alternately negative and positive, which passes through the coils of the Indicator, moving the needle as mentioned above. The first operation is to draw out the brass button on the side of the case at both stations, then by turning the handle one whole revolution on either station, it will give a signal on a bell attached to the Indicator. After the signals are received, the small ivory button below the dial of the Indicator is pressed inwards, and at the same time the handle turned until both the needle of the Indicator and the handle are on the blank field of the dials, when the instruments are in order for giving or receiving dispatches.

145. Portion of the Original Submarine Telegraph Cable laid down between Dover and Calais; Exhibited by T. R. Crampton, C.E., Buckingham-street, Adelphi.

This cable was taken up by Mr. Crampton during the repairs in January last, after having been submerged more than five years. It will be seen upon inspection that for all practical purposes it is equal to new, the gutta-percha being perfectly sound. This is a piece of the identical cable that first established the practicability of submarine telegraphs.

- 145A. Patent Arithmometer; Thomas de Colmar. Exhibited by P. de Fontainemoreau, 4, South-street, Finsbury.

- 145B. Improvements in Frames of Pianofortes; John Dewrance, 33, Soho-square.

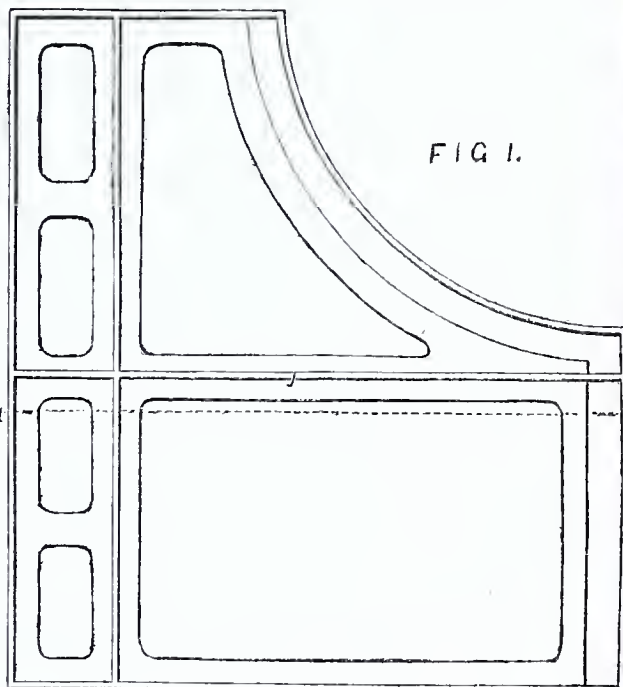


FIG. 2.

In this invention the improvement consists in a novel mode of constructing the frame of cast-iron. The shape of the framing must of course depend upon the particular description of instrument to which it is to be applied, and the particular section of the iron framing must also in a great measure depend upon the same circumstances, and may be varied; but in practice, the T-shaped bar has been found to answer the purpose, and therefore it is preferred to use this form. For the purpose of receiving the pins on which the strings are secured, a piece of hard wood is employed, which must be let into the frame, and fastened by bolts or screws. The surface of this piece of wood may be covered with a plate of soft metal, such as zinc or tin, so as to enable the bolts to hold the wood more securely. The sounding-board and bridge should be made of wood, and secured to the cast metal frame. Fig. 1 is a front view of one of the improved cast-iron framings; and fig. 2 is a sectional view, taken in the line H, G, of fig. 1. In this instance the strain of the strings is counteracted both in the head-beam and by the central longitudinal bar, J. A flange, b, is employed to support the piece of wood which receives the pins of the strings. Several forms of framing may be adopted for different kinds of instruments, the illustration showing one of the forms used. The several parts of these metal frames are cast together, and form one

piece; and although cast-iron has been named as the material to be employed in making the metal frame, other metals or alloys of metal may be used with advantage for the best class of instruments.

158A. Specimens illustrative of a new process coating cast iron and other metals with copper, &c.; L. Oudry, 2, Dunstons-court, Mincing-lane.

The peculiarity of this process consists in the employment of an intermediate layer, of gummy, resinous, or other substance, between the surface of the metal to be protected and the electro deposit.

189c. Aquarium. Exhibited by Philip Palmer, 118, St. Martin's-lane.

189d. Improved Reflectors; U. Scott, 14 Grove-street, Camden-town.

These reflectors are made of sheet iron, and the surface is enamelled with glass or china.

215. Embroidery, executed by Machinery. Exhibited by P. de Fontainemoreau, South-street, Finsbury.

LIST OF EXHIBITORS.

N.B.—The figures after the names refer to the numbers in the Catalogue.

- OAMS, W. Bridges. 48.
 ock, John, Messrs. Dunn, Hattersley, & Co., Manchester.
 en, Edwd. E., 376, Strand. 46, 152.
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